OJIBWE CULTURE & KNOWLEDGE OF CLIMATE CHANGE
IN FOURTH-GRADE CURRICULA
IN WISCONSIN PUBLIC ELEMENTARY SCHOOLS

by Michael L. Aprill

A dissertation submitted in partial fulfillment of
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Abstract

The first purpose of this study was to provide recommendations for educators to update their fourth-grade social-studies and science curricula by including more accurate and thorough representation of Ojibwe knowledge about climate change. My second purpose was to enrich curricula by including better information about Ojibwe culture, ecology, and knowledge. I also learned how Ojibwe people were impacted by climate disruption, and how Ojibwe Elders related to and talked about climate. During this study, I observed and participated in a Climate Strong! Professional Development Institute that featured presentations by selected Ojibwe Elders. I conducted ten interviews with Ojibwe Elders of both the Red Cliff and Bad River Bands of Lake Superior Chippewa. I also interviewed three fourth-grade teachers from three schools and two extension educators who worked in tribal communities. I analyzed content and discourse in fourth-grade science and social-studies curricula, specifically on topics of climate disruption and Ojibwe culture. I recommend that educators include more accurate and thorough representations of Ojibwe knowledge about climate change in curricula and instruction.

Keywords: Ojibwe knowledge, Ojibwe Elders, climate disruption, climate change, science curriculum, social-studies curriculum
Dedication

I dedicate this to the elders past, current, and future that inspire young people to make a difference in the world and to the elders that have and continue to inspire my path.
Acknowledgements

I would like to express my gratitude and appreciation those that provided guidance, support, and encouragement to make this journey possible. Chi Miigwech to the Elders of the Bad River and Red Cliff Bands of Lake Superior Chippewa, for your kindness and humbly sharing your knowledge and wisdom of Ojibwe culture and climate disruption. Thank you to the UW-Extension educators working with these tribes and showing me the importance of climate mitigation and education. Thank you to my school district for your support; to my students for your encouragement, and the fourth-grade teachers for sharing your experiences about teaching fourth grade. Dr. Parajuli thank you for helping me conceptualize this project, Dr. Rice and Dr. Johns Danforth thank you for your cultural guidance and encouragement, Dr. O’Neil thank you for your inspiration and guidance analyzing data, and thank you to Dr. St. Maurice for your editing. Thank you to my family for your support and understanding. Especially, thank you to Pat and our five children; Javier, Catalina, Matthew, Elizabeth, and Nicolai for the sacrifices and your patience, understanding, encouragement, and believing in me. Without you this project would not have reached fruition.
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Chapter 1. Introduction

This study is about locally and bio-regionally informed ways to find solutions to the process of rapid climate disruption. It focused on traditions of the Ojibwe people and how to integrate their knowledge about climate into fourth-grade science and social-studies curricula in Wisconsin. Such curricular intervention could help students not only better comprehend the Ojibwe place in Wisconsin but also show potential ways to addressing and hopefully solving climate disruption for Native and non-Native people. This study uniquely combines analyses of curricula on climate change with analyses of Ojibwe traditions.

In this study, I followed four steps. First, I did qualitative content analysis (QCA) of the fourth-grade curriculum of three Wisconsin public elementary schools, hereinafter referred to as WES. Second, I conducted interviews with ten Ojibwe Elders (a.k.a. Knowledge Keepers). Five Elders were from the Red Cliff Band of Lake Superior Chippewa and five Elders from the Bad River Band of Lake Superior Chippewa. Third, I conducted interviews with five educators, three of whom were educators of science and social-studies in fourth grade, and two of whom were University of Wisconsin-Extension educators involved in tribal education.

Context

There has been long-standing conflict between Ojibwe and Non-Ojibwe, however, 1975-1989 was a turning point in which the Ojibwe exercised their treaty rights after not doing so for generations. (Pamela Johns Danforth, Oneida, August 15, 2020) This ignited long standing animosity and violence which escalated during the Walleye Wars of 1983-1989, during which time Indigenous people exercised their treaty rights to spearfish and non-Indigenous people protested. (Nesper, 2002, p. 7) In 1989, Wisconsin public-school graduates
had little awareness of historical or contemporary Indigenous issues. (Leary, 2018, p. 85). In response, the state legislature passed Act 31 (American Indian Studies Act, 1989/1991) to “restore the social fabric, heal existing wounds, and re-establish appositive reputation and business climate” (Leary, 2018, p. 86). When Act 31 passed, “American Indians were largely invisible and stereotypically portrayed when included in curricula guides and other policy documents due to broader national concerns in the field” (Leary, 2018, p. 133).

The passage of Act 31 led to curriculum reform. Advocates representing both Indigenous and Indigenous allies addressed a complex set of social and educational concerns. Although, Act 31 was designed to reduce racial conflict, it posed an opportunity to implement curricula in the fourth-grade that can educate young people about Ojibwe culture as well as the impact this culture faces due to climate change.

This study took place at three locations. First, interviews were conducted among Elders in both the Bad River and Red Cliff Bands of the Lake Superior Chippewa. Both the Bad River and Red Cliff bands are considered Ojibwe people, with common worldviews and cosmologies. Elders are not defined solely by age, but rather Ojibwe eldership was defined by McNally (2009) as, “religious authority that acknowledges the maturation of a person over time and that values their ways of knowing” (p. 23). Not all elderly people are considered Elders, but all Elders are elderly. According to Pamela Johns Danforth, “a tribe may designate a tribal member as an Elder at a particular age, but that age may be elevated for events such as pow wows.” (Oneida Nation, personal communication, June 7, 2019). In general, fifty-five is the age to be considered an Elder within these tribes. (Bad River Band of Lake Superior Chippewa, Sandy Corbine & Red Cliff Band of Lake Superior Chippewa, Anna Hanson, personal communication, April 25, 2019) Eldership is based upon community recognition.
Because Elders are considered the “Knowledge Keepers” of Ojibwe culture that is passed down from one generation to another, I chose to interview these Elders and observe presentations of selected Elders to represent the knowledge of the Ojibwe people in both the Bad River and Red Cliff bands.

Second, I interviewed UW-Extension educators who have worked closely with the Bad River and Red Cliff bands on issues of culture and climate change. Because these educators have worked with both Indigenous and non-Indigenous students and educators, they represented a crossover of knowledge between the two groups.

The third group of people I worked with included educators of science and social-studies in fourth grade. The fourth-grade is the primary grade in which culture is presented to elementary students in Wisconsin. Wisconsin Science Standards (WSS) were updated in 2017 based on the Next-Generation Science Standards (NGSS). (WI DPI, 2017) The Wisconsin Standards for Social Studies (WI DPI, 2018a) are currently being evaluated for implementation in the near future. Thus, it is timely that this research included an analysis of the curricula and the relationship of climate change and Ojibwe culture. Analysis of the curricula, determining any gaps in the curricula in terms of climate education and Ojibwe culture presents itself at a time in which recommendations for the implementing potential transdisciplinary curricula. In these particular Wisconsin elementary schools (WES), two of the teachers delivered the science and social-studies curricula in their school and the third teacher belonged to a Professional Learning Community (PLC) in which she delivered the social-studies curriculum, but is familiar with her PLC colleagues’ delivery of the science curriculum. The teachers, curriculum team, and administrators have been receptive and supportive of my evaluation and potential recommendations for advancing the science and social-studies curricula.
Through interviews with tribal Elders, UW-Extension educators who worked closely with the tribes, interviews with WES fourth-grade educators, QCA, CDA, and RTA, I have identified opportunities for enrichment of the fourth-grade curriculum that will provide an opportunity for greater depth and respect for Indigenous Knowledge and tribal knowledge as presented by Elders about climate disruption. I also make recommendations to provide reciprocity for participants.

Glossary of Terms

The following terms will be used in this study:


- **Anishinaabeg or Anishinaabe**: This is the term that the Ojibwe use to refer to themselves. It translates to “True People” or “The Original People.”

- **Anishinaabemowin**: The Ojibwe language.

- **Bad River Band of Lake Superior Chippewa**: A band of Ojibwe people including 6,945 members (WI DPI, 2018b), of whom 1,479 live on the reservation (US Census Bureau, 2010). According to legend, the Great Spirit told the Anishinaabe to move
from the east coast to the place where food grows on the water. This food, wild rice, *Zizania palustris*, was found at the present-day site of the Bad River Reservation.

- **Climate change or climate disruption**: The definition that will be used for this study is mostly aligned with the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC defines climate change any indirect or direct human activity which may alter the composition of Earth’s global atmosphere. (UNFCCC, 2011) “Global warming” will not be used in this study. The terms climate change and climate disruption will be used interchangeably, however, the author prefers the term climate disruption.

- **Elder and elder**: Elder will reference a person who is an Ojibwe “Knowledge Keeper.” Elders pass down knowledge and culture from one generation to another through stories. They are people within their tribe that are respected for their knowledge and contributions they have made throughout life. All Elders are elderly, but not all elders are Elders. (McNally, 2009, p 23) Eldership “implies an obligation to pass along knowledge and power for the furtherance of life,” (Ch. 1)

- **Indigenous or Native or Aboriginal**: These terms are used interchangeably. Other terms that are used in the literature include First Nations in Canada or American Indian in the USA. Indigenous people around the world encourage others to use their tribal self-name when possible. (Prine Pauls, 2008) The tribal self-name used most in this study will refer to Ojibwe or Chippewa.

- **Manoomin or wild rice**: “food that grows on the water.” It is an aquatic grass that grows in water of four to five feet deep. (Wunderlin, 2015). It has been a staple in the diets of Natives to the Great Lakes region for more than 1,000 years. (Johnson,
1970) Today it is important to Ojibwe diet and culture. (Vennum, 1998) Manoomin is a sacred food to the Ojibwe and retains considerable importance to the Chippewa. (David, 2010, p. 1)

- **Ojibwe:** Also spelled Ojibwa or Ojibway. Sometimes referred to as Chippewa, Anishinaabe, La Pointe Band, or Algonquin. Six bands of Native Americans that migrated from the east coast of the United States to Wisconsin. The terms Ojibwe and Anishinaabe are used hereinafter.

- **Next-Generation Science Standards (NGSS):** Released in 2013, these K-12 science standards were developed in cooperation with several stated and organizations such as the National Research Council (NRC), the National Science Teachers Association (NSTA), and the American Association of the Advancement of Science ([AAAS] (NGSS, 2019). According to the WI DPI, 80% of school districts in Wisconsin were using the NGSS standards. (Anderson, 2017)

- **Red Cliff Band of Lake Superior Chippewa:** a band of Ojibwe people. According to legend, an Anishinaabe prophecy, the Great Spirit, told the Anishinaabe to move from the east coast to the place where the plants grow on the water. Their reservation is the closest band to Madeline Island, the Ojibwe capital. In 2018, there were 5,312 members of this band, approximately half live on the reservation, and most of the remainder live in nearby Bayfield. (WI DPI, 2018c)

- **Reservation or Reserve:** Reservation is the term used to refer land managed by American Indians under United States Department of Interior (USDIO): Indian Affairs and designated for a tribe or tribes under treaty. (USDIO: Indian Affairs,
The term reserve is used by the Indian Act in Canada to refer to land governed by tribes or bands within the First Nations. (McCue, 2011)

- **Traditional Ecological Knowledge (TEK):** Also referred to as “Indigenous Knowledge” or “Native Science or Traditional Knowledge.” TEK is knowledge that is acquired by local people over hundreds or thousands of years via direct contact with their environment.

- **Tribe or band:** The Ojibwe or Chippewa people are regarded as a tribe and the people of the Bad River and Red Cliff Reservations are referred to as bands of the Lake Superior Tribe of Chippewa Indians. These two bands maintain close relationships.

- **Wisconsin Elementary School (WES):** In this study to maintain privacy of selected schools, WES refers to Wisconsin elementary schools.

- **Wisconsin Science Standards (WSS):** Standards adopted by the Wisconsin DPI in 2017 that identify what students in the state should be able to know and do in science. They are based on the NGSS which were released in 2013. (WI DPI, 2017)

- **Wisconsin Standards for Social Studies:** Standards adopted by the Wisconsin DPI in 2018 that identify what students in the state should be able to know and do in social studies. (WI DPI, 2018a)

**Problem Statement**

The Wisconsin standards for social studies curriculum for grades three to five refer often to Native American knowledge, tribes, culture, and the environment climate (2018, pp. 22-27, 36-38, 41-44, 48, 50-54). Many studies prior to and following the passage of Act 31 support the need for Ojibwe knowledge (e.g., Hadley & Trechter, 2014; Moody, 2013, pp. 4-
5, 16). Other studies on implementation of the NGSS have emphasized inquiry into critical problems such as climate change. However, no such studies have been done which take Ojibwe Elder knowledge into consideration or completed a content analysis for climate change, Ojibwe knowledge, and certainly not the both of these at the fourth-grade level in Wisconsin. Utilizing Ojibwe Elder knowledge may bring great depth to the current curricula in a WES. This study filled a gap of Ojibwe knowledge, climate change and disruption, as well as their impacts on Ojibwe culture.

**Purpose Statement**

The primary purpose of this study was to provide recommendations for educators to update their social-studies and science curricula of by including more accurate and thorough representations of Ojibwe knowledge about climate change to enrich fourth-grade curricula in science and social-studies. Five secondary purposes were as follows:

- Learn how Ojibwe people are impacted by climate disruption;
- Explore how Ojibwe Elders define climate and how they notice climate is changing and is disrupted;
- Explore how Ojibwe Elders relate to and talk about climate in terms of their overall ecology, culture, and knowledge traditions;
- Analyze science and social-studies texts for evidence of Ojibwe ecology, culture, and knowledge about climate and climate change;
- Assess educators’ understanding and teaching of Ojibwe culture, ecology, and knowledge; and

In addition to these purposes and research question, I learned much about Ojibwe culture through his interactions with the Bad River and Red Cliff Tribal Communities.
Research Question

The research question guiding this study is as follows: “What are Ojibwe Elders’ and fourth-grade educators’ perceptions of how a more accurate and thorough representation of Ojibwe knowledge about climate change could enrich fourth-grade science and social-studies?”

Theoretical Models

The theoretical model for this study is based on eighteen characteristics associated with Indigenous ways of knowing. (Kimmerer, 2013; LaDuke, 2003; Rice, 2005; Nelson, 2014; Cajete, 1994a). Characteristics listed in alphabetical order are as follows:

- Balance;
- Cyclical & spiraling;
- Fluidity;
- Gratitude;
- Harmonious coexistence;
- Holistic;
- Humility;
- Kincentrism;
- Kindness;
- Liberty;
- Oneness;
- Reciprocity;
- Relationality;
- Respect;
- Restorative;
- Sharing;
- Survival; and
These eighteen characteristics denote recurring themes connected to Indigenous ways of knowing. (Rice, 2005) As presented in his text, they are components of the Indigenous. Other authors (e.g., Kimmerer, 2013; LaDuke, 2003; Nelson, 2014; Cajete, 1994a) also mentioned many of these eighteen characteristics. Several of these themes: humility, honesty, wisdom, truth, respect, and kindness [love] are recognized as part of “Grandfather’s Seven Teachings” (Benton-Banai, 1988).

The eighteen characteristics each play a part in Indigenous cosmology that encompasses many Indigenous theories (e.g., critical Indigenous theory & Indigenous wholistic theory), which in turn inform one of the purposes in this study: providing an opportunity for tribal Elders, as Knowledge Keepers of the Ojibwe people to express their voices and share the impact climate disruption has had or may have on their culture. The voices of Elders as tribal representatives of Indigenous Knowledge may lead to regeneration of Ojibwe culture. Figure 1 illustrates the Indigenous cosmology that is the theoretical model for this study.

*Figure 1. Theoretical Model*
The theoretical model (Figure 1) was designed with the eighteen characteristics in mind. Several are visually seen in its design including cyclical spiraling, holistic, balance, relatedness, sharing, oneness, and restorative. The Indigenous-cosmology worldview interconnects and includes Indigenous theories and regenerates Indigenous climate knowledge. This model shows how Elder knowledge of Ojibwe culture connects with their experiences of climate disruption to inform fourth-grade curriculum in WES.

Indigenous peoples’ worldviews are intricately connected with nature (Battiste, 2000, 2002; Michell, 2007). Understanding Indigenous worldviews requires an understanding of the concept of “coming to know … a journey, a process, and a quest for knowledge and understanding” (Cajete, 2000, p. 66). Coming to know engages students in navigating their own cultural experiences, understanding of the physical world, biological world, understanding their community, and understanding the norms of Western science. (Aikenhead, 2002, p. 154). It requires a personal reflection of Indigenous Knowledge and Western Science (Williams & Snively, 2016, p. 37). Stories are an integral component of Indigenous theories. According to Cajete (2000), science becomes the story that tells how things work. Although, science may tell us how things work, the mind becomes the place where “myth, science, and our human perception of reality meet” (p. 13). Indigenous stories told to youth, families, and communities are essential to Indigenous ways. These metaphors relate to the interconnectedness of plants, animals and place (Williams & Snively, 2016). In Indigenous theories, everything living or non-living has spirit. And, everything in the universe is alive and has a place within the universe (Cajete, 1999, 2000).

As I evaluated curricula and looked for alignment with Indigenous ways in the WES at the fourth-grade level, I considered curriculum theories. As Apple (1971) stated, there is
always a “hidden curriculum” that I explored. Apple suggested that curricular texts, themes, and content are never neutral, that they represent corporate and political power. Apple (2001a) added that curricula address multiculturalism at superficially in the ‘safest’ form (p. v). Integrating Indigenous theories could potentially address multiculturalism as discussed by Cajete et al. (2011, pp. 317-378). Ideas from both Cajete’s and Apple’s theories are used in this study’s analyses.

Ojibwe Elders as Knowledge Keepers may present ways in which fourth-grade curricula could better represent the beliefs and knowledge of Ojibwe people in Wisconsin, specifically their knowledge of climate disruption, could help break through potential hidden curriculum and lead to curricula that is more deeply connected with Ojibwe ways. Although theories by Cajete (2000) and Apple (2001a) might appear to be at opposite ends of a spectrum, several ideas related to their curriculum models do illustrate some overlap as relevant to this study. Both theories have indicated the importance of place and multiculturalism in curricula. They both have asserted that curricula are not seen through the eyes of the oppressed, and the effects of hidden curricula. Table 1 compares aspects of curriculum models in works by Apple (1971, 2001a, 2001b) and Cajete (1994a, 1994b, 1999, 2000, 2015).

Table 1. Curricular Models

<table>
<thead>
<tr>
<th>Apple</th>
<th>Cajete</th>
<th>Commonality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power &amp; knowledge</td>
<td>Cosmology</td>
<td>Multiculturalism</td>
</tr>
<tr>
<td>Agenda driven curriculum</td>
<td>Ways of knowing</td>
<td>Importance of Place</td>
</tr>
<tr>
<td>Books are not neutral</td>
<td>Honors Indigenous Knowledge</td>
<td>Curriculum should be through eyes of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the oppressed</td>
</tr>
<tr>
<td>Superficial multiculturalism</td>
<td>Need intellectual bridges</td>
<td>Avoid Hidden curriculum</td>
</tr>
</tbody>
</table>
Multiculturalism is a major commonality of these two models. Apple (2001b) stated that curricula do not to promote multiculturalism, and “was not a gift,” “took decades of struggle over a White-dominated power structure,” and is “in special sections in textbooks” as “‘add-ons’ about the culture and history of ‘the other’” (p. v). He specifically identified Native Americans as one of the groups that “feels that their cultures and histories are not being represented in the curriculum.” (p. v.) He would prefer “specifically anti-racist education.” (p. vi). For his part, Cajete (1994a) stated:

Modern education and traditional education can no longer afford to remain historically and contextually separate entities. Every community must integrate the learning occurring through modern education with the cultural bases of knowledge and value orientations essential to perpetuate its way of life (p. 18).

Cajete (1994a) also explained that “modern education provides tools essential to the survival of Indian people and communities, but this education must be within the context of a greater cultural whole” (p. 18). Lastly, he said we can begin to understand colonization “by realizing that there are alternative cultural realities and by honoring their presence” (p. 78).
Another important commonality is the significance of place. Apple (2017) stated “obviously we need to go into these dialogues with respect for real people’s concerns and a greater knowledge of the local” (p. 252). Cajete (1994a) said that Western culture “through its unique play of history” has “disconnected itself from the wellspring of the unconscious and ancient primal orientations to spiritual ecology and a deeply internalized sense of place” (p. 81).

Another commonality is that curriculum should be viewed through the eyes of the oppressed. Multicultural and anti-racial curricula can give voice to the oppressed. Michael Apple (2001) stated that “they [students] do not see the world through the eyes of the identifiable people who are on the bottom, so to speak, socially” (p. v).

The last commonality among theories by Apple and Cajete is that many curricula are hidden. Apple (1993) stated that “hidden curriculum in schools serves to reinforce basic rules surrounding the nature of conflict and its uses” (p. 67). A hidden curriculum is a “deliberate attempt to maintain inequality based on race and class.” (Apple, 1990, p. 84) Cajete (1994a) said that modern education embeds a hidden curriculum that has resulted in a “colonization of perception” (p. 78). Cajete (1994a) also explained that “the hidden curriculum of modern education must be examined,” especially the as it relates to Indian America. (p. 131) These critical theories of curriculum and their three major commonalities were the framework for analyzing data found in this study.

Significance of the Study

Climate change is a critical 21st century challenge and it is pivotal that we develop strategies to educate about the impacts of climate change and potential solutions. Despite reports by sustainability scientists (e.g. IPCC, 2018; IPCC, 2019), school curricula (e.g. Project
Everyone & The Global Goals Campaign, 2020) have not integrated culturally responsive pedagogies developed by tribal scholars and Elders.

The study fills four gaps between Wisconsin Elementary School (WES) curricula and Ojibwe knowledge of climate change and disruption, and its impacts on Ojibwe culture. First, in interviews I documented reported perceptions of Elders and educators who implement curricula to inform WES science and social-studies curricula. Second, this study is a report on how Ojibwe Elders defined climate and how they related and talked about climate in terms of their ecology, culture, and traditions. Third, I report what I learned about Ojibwe culture as I interacted with the Bad River and Red Cliff Tribal Communities. Fourth, I make recommendations for educators to update their social-studies and science curricula. Ojibwe Elder knowledge of climate disruption was utilized to better represent the beliefs and knowledge of Ojibwe people in Wisconsin and incorporate into curricula their worldviews and knowledge of sustainability.

Positionality

I could not be an insider when it comes to conducting a study of Indigenous people. I am a middle-class, middle-aged, White man. I have no Native blood that I know of, nor have I lived on a reservation. Thus, my positionality is not of race or class.

My family and I wonder whether our lives might reflect some characteristics of indigenosity, kincentricity, and ecological ethnicity. Many years ago, when I became an earth science teacher, I began feeling conflict between who I was and the way I was living my life and teaching my students. As I taught my students about the earth and climate disruption, I taught my students to be ecologically friendly, recycle, live close to nature, limit their footprint, but in many ways I felt that I was not doing all that I could do. I choose to participate in
educational opportunities to learn how I could better do my part. In 2001, my spouse and I moved away from the city. We bought the property, not for the home, but for the trees, rolling hills, wildlife, and close proximity to the state forest. We knew we would modify the home as we needed to make it our own, but also make it part of the landscape and incorporate green building practices.

Several years later, we knew we wanted to help others and decided to expand our family while serving our community as foster parents. When designing an addition to our home, we wanted it to accommodate foster sibling groups and meet the space requirements by the state, as well include green construction methods such as passive solar window configurations and skylights for natural lighting. We also choose environmentally friendly bamboo floors and built into a hill to utilize natural heating and cooling. Additionally, we expanded our small orchard, vegetable garden, and vineyard. Any of those alone probably did not mean much, but what in the years that followed continually found ways to limit our environmental impact. In 2014, our well essentially went dry, producing less than 100 gallons of water a day. That sounds like a lot of water, but according to the USGS, the average person uses 80 to 100 gallons a day within their home. (USGS, 2019) We instantly felt marginalized and realized how dependent we were on water. At the time, we had 2 adopted children and five additional foster children, forcing us to take drastic measures to conserve the limited water. We scheduled laundry times, rationed water for cooking, cleaning, showers and other bathroom necessities. We installed water barrels to collect rain water. We even took showers in the rain which we made into a game for the kids. Our garden was moved to the front of the property where there was a 30 foot drop in elevation so we could take advantage of gravity for watering the garden. Later that summer we saved enough to drill a new well, unfortunately, it had to be drilled 150
feet deeper. We decided we continue conserving our water resources as we saw first-hand that water is not unlimited. This was one of the biggest lessons I could have taught my children as we all took water for granted. And, to this day, my family continues to conserve water.

Although we did a lot to reduce our dependence on water, I felt we needed to reduce our dependency on electricity. In 2016 we installed 10,000-watt photovoltaic system and two years later another 10,000 watts of solar. In all we have 76 solar panels and our excess power feeds back to the grid. We then replaced our family vehicle with a hybrid which we may connect to our home electrical grid, often charging from the solar panels.

Although, we still deeply depend upon fossil fuels, my family and I think about energy, water, and food daily. I have dedicated my family to becoming more of what professor Parajuli calls “ecological ethnicity” as we spend more time outside, listening to the frogs, birds, and trees (Parajuli, 2004; 2016). And, becoming one with the soil as we tend the garden with our hands. Recently, we committed to expanding our family farm by including chickens, in addition to our goats. Prior to adding chickens, the tick population had boomed locally, risk the spread of disease to both humans and animals. Although, our primary purpose was to have the chickens naturally control ticks population and reduce our risk to Lyme’s Disease, the chickens have produced more eggs than we require, allowing us to share eggs with families in need. This has been especially helpful with the recent shortage of eggs due to the COVID-19 pandemic.

The past two summers, we have prepared a Three Sisters garden. The purpose of this garden is threefold. One, companion gardening is more efficient than traditional gardening and has shown my children ways we can learn from Indigenous Knowledge. Two, my family has connected more closely with the food we eat. Third, this has been of particular importance as
I teach my children about their heritage as my two oldest children are of Indigenous heritage, Cherokee and Aborigine Mexican decent. As we built the mounds of our Three Sisters garden and amended the soil with our home-grown goat and chicken compost, I told my children about the Three Sisters. Their questions and curiosity fostered greater connection to their ancestry.

My positionality is influenced by the lenses I view my research topics: Ojibwe culture, knowledge, and ecology and impact from climate disruption, as well as, how this knowledge may inform fourth-grade science and social-studies curricula. My positionality could be considered a worldview of life practices such as indigenousity, kincentricity, and ecological ethnicity. As can be seen by the way my family and I live our lives, these ideas greatly influence who I am as a person and therefore my positionality.

Some scholars such as Geoffrey Benjamin (2017) have evaluated the meaning of the term indigenousity. Others, such as Prechtel (2001) stated that indigenousity includes “a person, plant, animal, or thing who belongs to a place” (p. 120). However, I pose the question, could a person such as myself, that is not Indigenous by blood or race and heritage live in a way which beholds the values of indigenousity? The term Indigenous is most often used in tribal context, but I want to engage the readers to this question: could this term be applied to those who have life experiences that align with a connection to the living and non-living, Earth, and universe? This does not make me an insider or Indigenous, but provides a perspective which helps bring me closer to Indigenous peoples and their earthbound cultures. This way, I could also make this research more relevant to me as a person.

Kincentricity, a term coined by Martinez (2008), recognizes the interconnectedness of human society & natural systems and the idea that we are all kin or relatives. Without acknowledging our connections to life around us, there will not be a healthy environment
Martinez & Hall, 2008; Senos et al., 2006). Additionally, Martinez (2008) said that Indigenous Knowledge could be kincentric and we are obligated to Earth and our communities (p. 3) Like Indigenous people, I would like to believe that my way of being aligns with kincentricity. Although, much of society is disconnected from the natural systems, I try to consider my footprint and impact on society and natural systems. Living on the edge of Wisconsin’s Kettle Moraine State Forest and surrounded by trees and wildlife, I am reminded daily of our interconnectedness, dependence, and human disruption to nature.

I feel deeply connected to my natural surroundings and a responsibility to the environment, and the relationship between the living and non-living in the cosmos. These feelings of kincentricity and cosmology have been influenced by my upbringing and are embedded in who I am as a person and researcher. I have learned that we are part of something greater and bigger than us. We are part of a living system, called Earth and everything we do impacts the Earth and Gaia speaks to us. I have learned that we were part of a great cosmology—the universe seemed almost endless. As a child I spent many nights stargazing would have had such an impact on my life. I am reminded of these nights often as I teach earth science courses, inspiring younger people and their planetary consciousness. I still get goosebumps each time I show a high school student the images of the planets, moons, and stars beyond our reach. I remind them often of the importance of our place in the cosmos. One event that will forever guide my place—the August 21st, 2017 total solar eclipse. The week before this eclipse, I packed up my seven children and spouse and we headed to Makanda, Illinois. I have no words to explain the beauty and cosmological coincidence that that Earth, Sun, and Moon are in the exact positions necessary to create the events of a total solar eclipse; just tears and emotion. Not only are these three cosmological bodies perfectly positioned, the size and
scale of the Moon is perfect in such a way that we are able to see the glowing radiation of the suns corona. You cannot explain a connection to the cosmos, only feel it. I hope that my children look back upon this day in which they became more connected to their place in the universe. As I started this research, I had an opportunity to hear stories about climate change and their impacts on Ojibwe people. Time and time again, there were cosmological undertones including the seasons, lunar cycle, forests, ground, water, and wildlife.

Following graduation from high school in 1993, I travelled to the remote small village of Ostional, Costa Rica where I studied sea turtles. Ostional is one of only a few places in the world where the Olive Ridley, Lepidochelys olivacea, nest in large congregations called arribadas. The community-based egg harvest generates income and awareness for protection of the sea turtles. (Valverde et al., 2012). The Natives of Ostional rely heavily on the legal harvest of the sea turtle eggs. It is the only place in Costa Rica where it sustainably managed to provide a protein source for locals, decrease predators, reduce bacteria and fungi surrounding the nests, and increase hatching rates of the endangered sea turtles. Shown in Photo 1 are the tracks of the hundreds of turtles that arrived to nest the night before in July 1993. Also, in the background, you can see some of the villagers legally harvesting the eggs. The destruction of this beach would be devastating to the villagers as it is integral to their survival. It was here that I realized how complex and “wicked” the problem of climate change really was and that climate justice affects people everywhere. A couple of nights later I was walking the beach as I did each night. I was very familiar with the beach, but the night before a huge tropical storm hit. As I was walking the beach I feel more than six feet to the estuary below due the changing beach contour from this giant storm. From this seminal moment forward, it has been impossible to forget the impact of climate change on Indigenous people.
Here I was able to see how marginalized people who are interconnected with nature and nature’s systems live day-to-day. Additionally, during this time, I was able to see the impacts of climate disruption on the fragile nesting beaches. When returning to the U.S., I continued to help the plight of the sea turtles. This included work with the “turtle safe shrimp” campaign and volunteering to help with sea turtle monitoring in Hawaii Volcanoes National Park (HVNP). Every action I took, every thought I had, I considered the Earth and the sea turtles.

*Figure 2. Tracks of Hundreds of Turtles from the Night Before, July 1993*

In Figure 3, I am shown studying sea turtles at age eighteen in July, 1993 (Aprill). Although, I no longer work with sea turtles, I always think about what I take and what I give back to nature and our interconnectedness to nature and its systems.

*Figure 3. Studying Sea Turtles, July 1993*
Am I an ecological ethnic? Ecological ethnicity is a social category that indicates a deep respect for natural resources. Ecological ethnics live their lives integrated to nature. (Parajuli, 1998). Although I did not know it growing up, my families respect for the natural resources and commitment to preserve local ecosystems sustainably aligns closely with ecological ethnicity. My family participated and organized many projects which contributed to my ecological ethnicity. We could not have survived on Earth without the Earth itself. We cannot continue to harm to Earth for our mere survival. The earth can only take so much of our abuse and misuse. We are reminded time-and-time again as rare climate events become regular occurrences.

My ecological ethnicity that ties my passion for climate science, protecting the earth, the human-nature bounds, and the importance of social justice. We cannot preserve nature without social justice. It is my ecological ethnicity that I find the significance of the human-nature reciprocal relationship.

I recently participated in a class in Northern Wisconsin where I was inspired to know more about the impact of climate change on Ojibwe culture. There are several key concepts of cosmology and Indigenous theory that influence my positionality. In review of the eighteen characteristics, I see many important ideas that have influenced my indigenous cosmology including relationality, reciprocity, inclusivity, survival, interconnectedness of humans and earth. My life experiences, especially those with the sea turtles in Costa Rica where I first worked with Indigenous people and observed the wicked problems of climate disruption and impact on Indigenous people first hand, and my way of living, connecting, and respecting the earth are all a part of who I am.
After learning from Indigenous people in the Red Cliff and Bad River bands, I was inspired by how they connect with the earth and are responsive to her cries. I am hopeful that my position as a doctoral student may provide me an outlet to help our Indigenous people and elevate education in my district at the same time.

As a parent, I have had my children come home in November on multiple occasions learning about Indigenous people in Wisconsin. I wondered, why does it seem that November is the only time my kids learn about Indigenous people? Is it because of Thanksgiving? Or, do some teachers do lessons in November because it is Native American Heritage month (National Congress of American Indians, 2019)? Have our schools forgotten about Wisconsin Act 31? Is Thanksgiving the only part of Indigenous culture we want to teach our children? Perhaps, it is the only time I noticed my children learning about Indigenous culture. And only once or twice has one of my children come home speaking of climate change. I know from my experiences with my children, that children inherently have an interest in climate disruption and biophilia. I wonder if we could tie these two ideas together. What if we gather and document knowledge from indigenous Elders and use that to inform what we teach about climate change and Indigenous cultures? Transdisciplinary or interdisciplinary learning is part of the way I teach, not just at school, but my children. Could incorporating Indigenous cosmology build a deeper connection to our Indigenous people, climate change or disruption, and our connection to the earth?

Four years ago, I took a new teaching position, where I continue to teach earth sciences and climate education. Around the same time, my spouse and I started a small business that has given me an opportunity to work with marginalized populations and assist them in locating sustainable housing. The perspective of a small business owner, working directly to help
marginalized people obtain sustainable housing, and more recently the COVID-19 pandemic has altered my view of survival. How can marginalized people focus on climate change and climate change adaptation when they must first consider food, clothing, health, and housing?

I then wondered about how many other towns are out there where marginalized populations are unprepared for climate adaptation. Are any societies “immune” from the impact of climate change? Could entire communities, groups of people, or their cultures be impacted or destroyed by climate change? If the Roman empire can collapse, can any society collapse? No society is immune from collapse.

I am looking forward to witness and recognize how it will continue to change throughout my studies and after that. My upbringing, class, education, and life experiences have all contributed to my positionality. As I focus my studies on Ojibwe culture, Ojibwe knowledge of climate change, and how Ojibwe culture and knowledge may inform fourth-grade science and social-studies curricula. Key ideas from cosmology and Indigenous theory come together to influence my worldview and most important theory—Indigenous cosmology. We must consider today how Ojibwe culture is being impacted by climate change and look to curriculum for both Indigenous and non-Indigenous people to build a framework for sustainable and regenerative future. We must help society and its populations become resilient and adapt to the effects of climate change.

**Summary**

My experiences have built a strong interest in Indigenous people, culture, climate disruption, and education. The Red Cliff and Bad River Elders have a great deal of knowledge of climate disruption and impacts on their culture. At the onset of this research I have identified 18 characteristics of Ojibwe people. These characteristics provided the framework for my
observations of Ojibwe people and data on how they think, talk, and communicate about climate disruption. My framework and the voices of the Elders are the bases for my findings and recommendations to enrich fourth-grade curricula.
Chapter 2. Literature Review

The primary purpose of this study is to provide recommendations for fourth-grade educators to update their social-studies and science curricula by including more accurate and thorough representations of Ojibwe knowledge, particularly about climate change. This literature review begins with a focus on topics related to Indigenous Knowledge and climate disruption in standards for social-studies and science curricula in one Wisconsin elementary school hereinafter referred to as WES. Although the literature review is based on WES1, the WES curricula were reviewed in depth during the data collection phase of the study and are discussed in the results. The second section reviews studies of Indigenous peoples’ worldviews, specifically Ojibwe, knowledge systems and culture, with focus on Indigenous Knowledge of climate.

School Curricula

Under the direction of Executive Order No. 326 (1998), Governor Tommy Thompson and the Governor’s Council on Model Academic Standards, Wisconsin Model Academic Standards (WMAS) were released for grades four, eight, and twelve. The standards included English-language arts, mathematics, and science (Fortier et al., 1998). WMAS for science and social studies were updated in 2018 and are not mandatory for local districts.

Social Studies

At the selected schools, locally designed curriculum standards were primarily based on the 1998 WMAS. WES1 was used for the initial literature review prior to data collection. During initial contact it was stated that they integrate content from various textbooks and sources. Their main source for social studies curriculum Wisconsin: Our State, Our Story (Malone et al., 2008). According to Kris McDaniel (2017), Wisconsin: Our State, Our Story
“208 of our 424 school districts (over 35,000 copies) have adopted the Wisconsin Historical Society textbook *Wisconsin: Our State, Our Story*” (para. 6). Another important source for curriculum is *The Great State Newspaper* (GSN, 2006-2016). GSN is a monthly newspaper that uses Wisconsin content standards to present factual historical data, historical characters, and events (Great State Educational Publishers, 2018). WES1 also stated that they use some additional sources by Loew (2013). Although the WI DPI released new standards that have been out for review since the 2018-19 school year and will be adopted by many Wisconsin school districts in 2019-20. At the time of the literature review, WES1 were still utilizing the 1998 WMAS. And, the review of the new standards are delayed due to the COVID-19 pandemic.

Table 2 shows 1998 WMAS for social studies that are relevant to this study. Because fourth-grade is the focus of this study, only standards in which students should be proficient in by the end of fourth grade were included. The table includes the content standard, fourth-grade performance standard code, performance standard description, and how it may have been used to meet the goals of teaching Ojibwe culture (OC), climate change (CC), or Ojibwe knowledge of climate change (KCC). It does not indicate if it was used for any of those purposes. Out of a total of 47 performance standards, only five fourth-grade performance standards had the potential to be used to educate about one of the three topics. Five performance standards had the potential to be used for educating about Ojibwe culture, while one standard had a potential to be used for teaching all three (WI DPI, 1999).

<table>
<thead>
<tr>
<th>Standard</th>
<th>Code</th>
<th>Performance</th>
<th>Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>History: Time, Continuity, &amp; Change</td>
<td>B.4.1</td>
<td>Identify &amp; examine various sources of information that are used for constructing an understanding of the past, such as artifacts, documents, letters, diaries, maps, textbooks,</td>
<td>OC</td>
</tr>
</tbody>
</table>

Table 2. Standards Used for Social Studies in Fourth Grade
I have compared these standards to assess how they may have been used to meet the goals of teaching Ojibwe culture (OC), climate change (CC), or Ojibwe knowledge of climate change (KCC). Table 3 shows codes, performance indicators, and potentials to be used for OC, CC, or KCC. Of the 64 performance standards, 23 were potentially connected (WI DPI, 2018a). Potentials included 21 (OC), 14 (CC), and 11 (KCC). Content related to inquiry (Inq.), economics (Econ.), and geography (Geog.) presented the greatest potential to include all three.

Table 3. Coded Wisconsin Standards for Social Studies in Third through Fifth Grades

<table>
<thead>
<tr>
<th>Content</th>
<th>Code</th>
<th>Performance</th>
<th>Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inquiry</td>
<td>SS.Inq3.bi.i</td>
<td>Cite evidence from multiple sources to support a claim.</td>
<td>OC, CC,</td>
</tr>
<tr>
<td></td>
<td>SS.Inq3.c.i</td>
<td>Elaborate how evidence supports a claim.</td>
<td>KCC</td>
</tr>
<tr>
<td></td>
<td>SS.Inq4.a.i</td>
<td>Communicate conclusions from a variety of teacher-provided presentation options.</td>
<td>OC, CC,</td>
</tr>
<tr>
<td>The Behavioral</td>
<td></td>
<td></td>
<td>KCC</td>
</tr>
<tr>
<td>Sciences:</td>
<td>E.4.4</td>
<td>Describe the ways in which ethnic cultures influence the daily lives of people.</td>
<td>OC</td>
</tr>
<tr>
<td>Individuals,</td>
<td>E.4.13</td>
<td>Investigate &amp; explain similarities &amp; differences in ways that cultures meet human needs.</td>
<td>OC, CC,</td>
</tr>
<tr>
<td>Institutions, &amp;</td>
<td></td>
<td></td>
<td>KCC</td>
</tr>
<tr>
<td>Society</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content</td>
<td>Code</td>
<td>Performance</td>
<td>Potential</td>
</tr>
<tr>
<td>-------------------------</td>
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<td>-----------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>SS.Inq5.a.i Civic</td>
<td>Engagement</td>
<td>Explore opportunities for personal or collaborative civic engagement with community, school, state, tribal, national, and/or global implications.</td>
<td>OC, CC, KCC</td>
</tr>
<tr>
<td><strong>Behavioral Health</strong></td>
<td>SS.BH1.a.4 Individual</td>
<td>Describe how a person's understanding, perceptions, &amp; behaviors are affected by relationships &amp; environments.</td>
<td>OC, CC, KCC</td>
</tr>
<tr>
<td></td>
<td>cognition, perception, &amp; behavior</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SS.BH1.b.4 Personal</td>
<td>Describe how culture, ethnicity, race, age, religion, gender, &amp; social class can help form self-image &amp; identity.</td>
<td>CC</td>
</tr>
<tr>
<td></td>
<td>identity &amp; empathy</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SS.BH2.a.4-5 Relationship of people &amp; groups</td>
<td>Compare how people from different cultures solve common problems, such as distribution of food, shelter, &amp; social interactions.</td>
<td>OC, CC, KCC</td>
</tr>
<tr>
<td></td>
<td>SS.BH2.b.4 Cultural</td>
<td>Give examples of how peoples from different cultures develop different values &amp; ways of interpreting experiences.</td>
<td>OC</td>
</tr>
<tr>
<td></td>
<td>patterns</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SS.BH3.a.5 Social Interactions</td>
<td>Investigate how interpretations of similarities &amp; differences between &amp; among cultures may lead to understandings or misunderstandings.</td>
<td>OC</td>
</tr>
<tr>
<td></td>
<td>SS.BH4.a.1 Progression of technology</td>
<td>Classify technologies based on intended use, access, &amp; design, &amp; how they might change people’s lives (for better or worse).</td>
<td>OC, CC</td>
</tr>
<tr>
<td><strong>Economics</strong></td>
<td>SS.Econ1.a.3 Choices &amp; Decision-Making</td>
<td>Categorize different limited resources (e.g., money, materials, time, labor, land, natural resources, renewable or non-renewable).</td>
<td>OC, CC, KCC</td>
</tr>
<tr>
<td><strong>Geography</strong></td>
<td>SS.Geog1.c.4-5 Mental Mapping &amp; Maps from Memory</td>
<td>Create &amp; label a map (paper or digital) of the local community, state, tribal lands, &amp; country, including both physical (e.g., oceans &amp; continents) &amp; human (e.g., roads, buildings) characteristics.</td>
<td>OC</td>
</tr>
<tr>
<td></td>
<td>SS.Geog3.a.5 Distribution of Resources</td>
<td>Classify a provided set of resources as renewable or nonrenewable, &amp; analyze the implications of both at the local, national, &amp; global level.</td>
<td>OC, CC, KCC</td>
</tr>
<tr>
<td></td>
<td>SS.Geog5.a.3-4 Human Environment Interaction</td>
<td>Compare the positive &amp; negative effects of human actions on our physical environment (e.g., availability of water, fertility of soils) over time</td>
<td>OC, CC, KCC</td>
</tr>
</tbody>
</table>
## Content

### SS.Geog5.b.5
Interdependence

Examine how human actions modify the physical environment when using natural resources (renewable & nonrenewable).

### History

#### SS.Hist1.a.i-b.i
Cause & Effect

Use evidence to draw conclusions about probable causes of historical events, issues, & problems.

#### SS.Hist2.b.i
Contextualization

Analyze individuals, groups, & events to understand why their contributions are important to historical change & continuity.

#### SS.Hist3.a.i
Connections

Compare events in Wisconsin history to a current issue or event.

#### SS.Hist3.b.i
Perspective

Identify different historical perspectives regarding people & events in the past.

#### SS.Hist3.c.i
Current Implications

Explain how historical events have possible implications on the present.

### PS

#### SS.PS2.c.4-5
Asserting & Reaffirming of Human Rights

Critique instances where groups have been denied access to power & rights, & any law or customs that have altered these instances.

#### SS.PS2.c.4-5
Asserting & Reaffirming of Human Rights

Summarize how people (e.g., religious groups, civil rights groups, workers, neighborhood residents) organize to gain a greater voice to impact & change their communities.

#### SS.PS3.a.m
Political Participation

Explain their role in government at the local, state, tribal, & federal levels.

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During Phase 1 of the study, WES1 indicated use of GSN as an important supplement for the social-studies curriculum. Of the topics listed (Table 4), WES1 indicated three of the issues they use that may be most relevant to this study and include Indigenous people and possibly climate disruption: Prehistory glaciers, mammoths, and Wisconsin’s first people; Exploration and early explorers; and The fur trade as most relevant to Indigenous people and possibly climate change.
In response to social unrest and Wisconsin 1989 Act 31 passed to implement greater knowledge of Wisconsin Indigenous people (Leary, 2018), a Social-Studies Curricular Development Task Force recommended that fourth-grade teachers provide “…interdisciplinary studies of our culture, environment, people, challenges, and successes.” (p. 151). Leary added, “Because Act 31 represented unprecedented specific directives to local school districts about curriculum content, it was contrary to traditions of incremental change and local control. (p. 222). Likewise, Trout (1982) found that most high school teachers omitted Indigenous tribal history and distorted the history of Indian-White relationships. (1982, p. 103). Accordingly, this study is focused on implementation of curricula aligned with state statute as well as standards.

**Science**

At the WES, science standards are based on the WMAS (1999). The standards officially adopted by the school district are the NGSS, based on which WES use the following four power standards in fourth grade:

1. Asking questions;
2. Using models, developing, planning, & carrying out investigations;
3. Analyzing & interpreting data; and

4. Using math, information, and computer technology, constructing explanations, engaging in argument from evidence, obtaining evaluating, & communicating information (NSTA, 2015).

In these power standards, climate-related terms occur as follows:

- Climate = 0;
- Weather = 0;
- Sunlight = 1;
- Resources = 6;
- Energy = 19;
- Society = 3;
- Culture = 0; and
- Water = 11.

The power standards do not fully address climate change or culture. References to climate are associated with energy and water.

Kocoroski et al. (2016), showed that when the natural world was integrated into science curriculum and that attitudes of students were altered by integrating science and technology while in the natural environment. This study found similar ways to correct omissions in WMAS as implemented in select school curricula.

In 2017, the school district adopted the *Houghton Mifflin Harcourt (HMH) Dimensions Program*, hereinafter referred to as *HMH Dimensions*, for the science curriculum at all elementary schools, grades K-5. HMH stated their “science programs are designed to encourage student-directed learning and deeper understanding of concepts. Open students’
minds to a world of scientific thinking.” (HMH, 2020) The curriculum was “Designed from the ground up to address the Next Generation Science Standards…This unique NGSS curriculum means better engagement, deeper understanding, and greater student achievement.” (HMH, 2020) In 2017 the Educational Research Institute of America (ERIA) conducted an independent study of the effectiveness of the *Science Dimensions Program*. The study focused on the grade five *Systems in Space* unit. It found “statistically significant increases based on pretest/post-test scores designed to assess the students’ knowledge and understand of the program” (ERIA, 2017, p. 7). When using this curriculum, each fourth-grade student is given two consumable workbooks for the year.

By default, the district is aligned with NGSS if using the *HMH Dimensions* curriculum in the elementary schools. I completed a review of *HMH Science Dimensions Teachers Edition Grade 4* (HMH, 2018) to see how the curriculum may have been used to meet the goals of teaching Ojibwe culture (OC), climate change (CC), or Ojibwe knowledge of climate change (KCC). Table 5 shows the following components of each unit: NGSS Performance Expectations (PE), Disciplinary Core Ideas (DCI), Science and Engineering Practices (SEP), Crosscutting Concepts (CCC) and potentials to be used for OC, CC, or KCC. This review was completed prior to any Elder interviews and based on explicitly written standards in the text. A further evaluation was completed after the interviews taking into account the theoretical framework and the eighteen characteristics. At the time of the literature review, it was not yet known which units the WES were using. For that reason, all eight units were evaluated during the literature review.
### Table 5. Potential for Climate Disruption or Ojibwe Culture in Units

<table>
<thead>
<tr>
<th>Unit</th>
<th>PE</th>
<th>DCI</th>
<th>SEP</th>
<th>CCC</th>
<th>Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, Engineering</td>
<td>3-5-ETS1-1, ETS1.A, asking questions &amp; defining problems, constructing explanations &amp; designing solutions, Planning &amp; carrying out investigations</td>
<td>Influence of science, engineering, &amp; technology on society &amp; the natural world</td>
<td>OC, KCC, CC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>1, 3-5-ETS1-1, ETS1.B, ETS1.C</td>
<td>OCT</td>
<td>OCT</td>
<td>OCT</td>
<td>OCT</td>
</tr>
<tr>
<td></td>
<td>3-5-ETS1-1, 3-5-ETS1-2, ETS1.B, ETS1.C</td>
<td>CC</td>
<td>CC</td>
<td>CC</td>
<td>CC</td>
</tr>
<tr>
<td></td>
<td>4-ESS2-1, 4-ESS2-2</td>
<td>ESS2.A, ESS2.B</td>
<td>Biogeology, Engaging in argument from evidence, Patterns</td>
<td>Cause &amp; Effect, Patterns</td>
<td>OC, CC, KCC</td>
</tr>
<tr>
<td>6, Changes to Earth’s Surface</td>
<td>4-ESS2-1, 4-ESS2-2</td>
<td>ESS2.A, ESS2.B</td>
<td>Biogeology, Engaging in argument from evidence, Patterns</td>
<td>Cause &amp; Effect, Patterns</td>
<td>OC, CC, KCC</td>
</tr>
<tr>
<td>Unit</td>
<td>PE</td>
<td>DCI</td>
<td>SEP</td>
<td>CCC</td>
<td>Potential</td>
</tr>
<tr>
<td>---------------------------</td>
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<td>------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>7, Rocks &amp; Fossils</td>
<td>4-ESS1-1</td>
<td>ESS1.C</td>
<td>Asking questions &amp; defining problems, constructing explanations &amp; designing solutions</td>
<td>Patterns, Systems knowledge assumes an order in natural systems</td>
<td>CC</td>
</tr>
<tr>
<td>8, Natural Resources &amp; Hazards</td>
<td>4-ESS3-1, ESS3.A, ESS3.B, ETS1.B</td>
<td>Obtaining, evaluating &amp; communicating information</td>
<td>cause &amp; effect, Interdependence of Science, Engineering, &amp; Technology, Influence of science, engineering, &amp; technology on society &amp; the natural world</td>
<td>OC, CC, KCC</td>
<td></td>
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</tbody>
</table>

*Legend: PE = Performance Expectations; DCI = Disciplinary Core Ideas; SE = Science & Engineering Practices; CCC = Crosscutting Concept*

**Indigenous People & Climate Change**

This section reviews literature on Indigenous people, specifically Ojibwe culture, worldviews, and knowledge systems, particularly knowledge of climate and climate disruption that has impacted Native culture in two Tribes.

According to the Federal Register there are 573 federally recognized tribes in the United States (Federal Register, 2018) and 634 First Nation communities in Canada (Gadac, 2015). There are currently 229 federally recognized Native villages or tribes in Alaska. (Alaskan Nature, 2019.) Wisconsin has 11 federally recognized tribes or bands, as listed below. The Ojibwe are located across a wide geographical area in in North America (Carufel, 1998).
Among thirty federally recognized tribes living in the Midwest United States, the Ojibwe are one of the largest tribes, comprising about 125 bands. Each band, such as Red Cliff and Bad River, that lives on a reservation under their control is referred to as a tribe.

Figure 4 illustrates Wisconsin’s eleven federally recognized tribes or bands. Six of these are descended from the Chippewa or Ojibwe, but the Ojibwe people were not always located in Wisconsin. According to legend, a great prophecy, the Creator, Gichi-manidoo, instructed the Anishinaabe to travel west, until they would reach the place where food grows on the water. It is believed that approximately 1500 years ago, the Ojibwe began their journey west. According to the story, they would make seven stops along the way. According to tradition, they stopped when they reached Manoomin. Manoomin, literally translates as, “food that grows on the water.” The wild rice was found not far from Madeline Island, near today’s Bad River Reservation. Madeline Island became the seventh and final resting spot of the Ojibwe (Loew, 2013). Madeline Island is the largest of the Apostle Islands located along the southern shore of Lake Superior.
In 1837 and 1842, The Ojibwe people were forced to concede much of their land, consisting of much of Northern Wisconsin, Minnesota, and Michigan’s Upper Peninsula. (Wrone, 1989). It would not be known to many years later, that the Ojibwe believed they were selling the land, not the rights to the land, rivers, and lakes, including the rights to hunt, fish, gather wild rice.

During the La Pointe Treaty of 1854, most of the Native People who settled on Madeline Island relocated to 120,000 acres on the Bad River Reservation, where the Ojibwe had set up their summer gardens. The Christianized Ojibwe, moved to 7,321 acres on the Red Cliff Reservation, near the tribal fishing grounds. (Loew, 2001, pp. 72-73). Today, most
Ojibwe live in the Great Lakes Region. This includes six bands of Ojibwe in Wisconsin, as follows:

- St. Croix Chippewa Indians of Wisconsin;
- Bad River Band of the Lake Superior Tribe of Chippewa of Wisconsin;
- Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin;
- Lac du Flambeau Band of Lake Superior Chippewa Indians of Wisconsin;
- Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin;
- Sokaogon Chippewa Community;
- Stockbridge Munsee Community;
- Forest County Potawatomi Community;
- Ho-Chunk Nation of Wisconsin;
- Menominee Indian Tribe of Wisconsin;
- Oneida Nation; and
- Sokaogon Chippewa Community (Loew, 2013)

In addition, there are approximately 100 Ojibwe reserves in Canada. (Carufel, 1998).

Indigenous people’s culture is interconnected to the Great Lakes. They considered water to be sacred, and depend upon this water resource to survive and sustain such cultural ways as ceremonies, fishing, subsistence, traditional arts and crafts. According to the tribal and First Nations Great Lakes Water Accord, “water is the life-blood of our Mother Earth” (2004, para. 2), and that it is their “spiritual and cultural responsibility to protect our [their] local lands and Waters in order to help protect the whole of Mother Earth” (2004, para. 4). Cozzetto et al. (2013) reported that water resources related to climate change have effects on American Indians and Alaskan Natives (AIAN) culture. (p. 570). Water is used for purification, blessings,
connections to Mother Earth and Father Sky; Cozzetto et al. (2013) stated, “As Native Americans, we honor and respect the tradition of water and must protect it always” (p. 570). In Minnesota, Wisconsin, and Upper Michigan, Ojibwe depend upon the water for wild rice, one of their most sacred foods. Increased temperatures may impact seed dormancy, favor invasive species that could outcompete wild rice, or lead to brown spot disease (MDNR, 2008). Indigenous people in the Great Lakes watershed rely upon the water to maintain their cultures and treaty rights of hunting, fishing, and gathering.

Understanding the Ojibwe creation story is significant to understanding their worldview. Johnston (1990) explained the story of how the Creator, Kitchi Manitou [Gitchie Manitou] first “created the physical world of sun, stars, moon, and earth” and on earth he “formed mountains, valleys, plains, islands, lakes, bays, and rivers.” (p. 12) Next, he “made the plant beings (p. 12).” Then he “created animal beings conferring on each special powers and natures. (p. 13)” The last order was man, “Though last in the order of creation, least in order of dependence, and weakest in bodily powers. (p. 13)” Lastly, he created “The Great Laws of Nature for the well-being and harmony of all things and all creatures” (p. 13).

The Ojibwe people have strong ties to the living and non-living worlds. These ties make them more vulnerable to the impact of climate change, or potentially more aware of those effects. Griffin (2009) conducted interviews with tribal members throughout Wisconsin. One interviewee indicated that Indigenous Knowledge (IK) and Native practices should be considered when looking for solutions to climate change:

Dominant society still has not accepted Indian people and we are continually educating them because they have not incorporated that education into a public school system or any system. It is a very minute part of it and now with global warming and climate
change, they are now starting to look at Native American practices, saying ‘Oh, Jeez, they were right all this time’ (p. 279).

Also, during the interview, the participant indicated that non-Indian education systems should start recognizing this knowledge and include it in curricula:

I think the non-Indian education system needs to boost up recognizing Native American culture as a valuable resource in the development of the United States itself. They need to change the history books and put in some of the prophecies that have come to be and will come to fruition, and recognize that we have a unique value to the Native American People (Griffin, 2009, p. 279).

During a graduate course, I visited Northern Wisconsin and spoke with Indigenous people of the Red Cliff and Bad River Bands of the Lake Superior Chippewa. During these discussions, climate change affecting their way of life was a recurring theme, indicating that recent extreme weather events and climate change are impacting what it means to be Ojibwe. Some of these impacts included threats to the wild rice due to inconsistent water levels, impacts on fishing, game animals, maple sugaring, harvesting of paper birch bark, and black ash. Because of the dependence on plants, animals, medicines, and the land, there appear that Ojibwe “ways of being” and survival are impacted by climate change. A literature review indicates many culturally significant components of Ojibwe life are impacted or may be altered in the future due to climate disruption.

To the Ojibwe, many of their foods are more than mere food, but medicine, culture, and integral to who they are. Of central importance is wild rice, *Zizania palustris*, a grain that is not actually rice. It is the only grain Native to North America (Oelke, 1993; Vennum, 1998). The Ojibwe migrated West following the directions of the Creator, to the place where food
grew on the water. (Loew, 2013) The wild rice’s tie to the Ojibwe origin story makes it one of the “sacred foods.” The plant grows about 1.3 meters tall in 60 to 120 centimeters of water (Magnuson, 2012). *Zizania palustris* is endemic to the Great Lakes region (Stickney, 1896; Taube, 1951) and common in Northern Minnesota, Wisconsin, and Michigan. Water level fluctuation at critical times may harm the plant and ultimately the Anishinaabe annual harvest which takes place in September.

In 2018, the Great Lakes Indian Fish and Wildlife Commission (GLIFWC), released the first version of their *Climate Change Vulnerability Assessment: Integrating Scientific and Traditional Ecological Knowledge* (Panci et al., 2018). GLIFWC is a natural resource agency which works with 11 Ojibwe tribes associated with the Treaties of 1836, 1837, 1842, and 1854. GLIFWC conducted TEK interviews with Elders, harvesters, and knowledge holders “to identify beings/species of concern and to provide evidence of how these beings/species have been or may be affected by climate change” (p. 2) A vulnerability score was created for each “being/species based on answers to the questions (p. 3)” in three categories: exposure, sensitivity, and adaptive capacity to climate change. Although GLIFC’s study also interviewed harvesters and other knowledge holders, I reviewed the assessment, excluding beings found outside of Wisconsin (i.e., Moose) to anticipate what may appear during the Elder interviews. Of the beings reported by Elders during the vulnerability assessment, Table 6 shows those beings identified as highly vulnerable or extremely vulnerable and listed those in order of increasing vulnerability. Beings are recorded in their highest level of vulnerability (Panci et al., 2018).
### Table 6. Vulnerability Assessment Findings

<table>
<thead>
<tr>
<th>Group</th>
<th>Highly Vulnerable Beings</th>
<th>Extremely Vulnerable Beings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants</td>
<td>princess pine, wild leek, wild ginger</td>
<td>ginseng, Labrador tea, wild rice</td>
</tr>
<tr>
<td>Mammals</td>
<td>cave bats</td>
<td>fisher, American marten, snowshoe hare</td>
</tr>
<tr>
<td>Fish</td>
<td>smallmouth bass</td>
<td>whitefish, walleye, perch, tullibee</td>
</tr>
<tr>
<td>Birds</td>
<td>trumpeter swan, wood duck, common loon</td>
<td>sharp-tailed grouse</td>
</tr>
</tbody>
</table>

*Note: Beings are listed in order of increasing vulnerability within the table. A being’s vulnerability category was based on its highest potential vulnerability as projected by GLIFWC (Panci et al, 2018).*

Climate disruptions such as floods or droughts may harm wild rice plants, impacting Ojibwe food, and their medicine, which are central to their ceremonies, and rituals. In conversations this author has had with tribal members, some believe that climate change is detrimental to impacting the wild rice and Ojibwe “way of life.” One tribal member described to me that “without wild rice, we are not Anishinaabe” (personal communication, 2018). According to Raster and Gish Hill (2016), “Wild rice is an essential part of what it means to be Ojibwe” and they “understand their history, cultural heritage, and very identity through their relationship with the plant and its ecosystem” (p. 267). David, of GLIFWC, stated that wild rice has cultural significance to the Ojibwe people (Wild Rice Restoration, 2004). O’Claire (2007), a member of Bad River Tribe and its natural resources department, explained that rice is needed for ceremonies, food crop, and medicine, as follows: “For us, it’s not just a food crop – it’s medicine. What happens to the rice happens to us” (Daily, 2007, para. 10).

Ojibwe consider the wild rice to be a sacred plant and medicine. It is essential to their ceremonies. They reinforce its importance through the stories and legends passed down through oral history. Wild rice is integrated into many aspects of their life cycle. It is the first food given to babies and one of the last foods given to Elders (LaDuke, 2011, para. 6). Stickney (1896, p. 116) explained that the Ojibwe considered the wild rice beds to be their “most
valuable property.” The annual wild rice harvest helps reseed the plant. Without the Ojibwe, the rice may not flourish. Climate disruption and decreased ice are detrimental to the wild rice. According to Magnuson (2012), the wild rice seeds are pushed into the mud of marshes and lakes. Because wild rice seeds require three to four months of below freezing temperatures, wild rice may be at risk (para. 10). In 2007, the Bad River Band of the Lake Superior tribe of Chippewa cancelled the annual wild rice harvest (UW Sea Grant, 2007), the first time in oral history that the Bad River Band of Lake Superior Chippewa faced a year without wild rice due to lower than average rainfall, a consequence of global warming (2007, p. 4). According to Ojibwe oral history, Lake Superior has only recently not frozen over in winter. According to Austin (2008), data suggests the “average ice cover has fallen from roughly 23% to 12% over the last century, most of that change within the last 30 years” (p. 2730). Ice cover protects the wild rice from invasive species (e.g. carp) (NICRN, *Regional impacts of climate change*, para. 4). Lopez (2019) stated the loss in ice cover affects ecologically important aquatic species as well. (para. 8) More than 600 families depend on wild rice throughout the year for food and ceremony (McManama, 2007, p. 4).

Ojibwe life and culture revolve around the seasons (Loew, 2013). In discussing climate and culture with tribal members, they have mentioned the changes they have observed over the past several decades. Loew (2013) discussed several traditional practices that revolve around the seasons and lunar cycles. In early spring, maple sugar and syrup are processed. Maple sap begins to run when daytime temperatures reach 40 or 50 degrees Fahrenheit and night-time temperatures fall below freezing. Another cultural practice involves the gathering of nuts, berries, and crops such as beans, corn, and squash, collectively known as the Three Sisters, which has traditionally been done by the women (Loew, 2013). Traditional practices are
associated with the thirteen full moons in Ojibwe culture. For example, *skigamizige-giizis* (maple sap boiling moon), which occurs in April, no longer coincides with the harvest of maple sap.

**Summary**

This review of science and social-studies standards and curricula used in fourth-grade in three Wisconsin elementary schools (WES) focused on topics related to Indigenous Knowledge and climate disruption. It then turned to studies of the background of Indigenous people in Wisconsin and specific Ojibwe worldviews, knowledge systems, and culture, with emphasis on Indigenous Knowledge of climate. This review showed gaps in curricula used in presenting knowledge about Indigenous culture and science, especially as related to climate change.
Chapter 3. Research Design and Methodology

The research question guiding this study is as follows: “What are Ojibwe Elders’ and fourth-grade educators’ perceptions of how a more accurate and thorough representation of Ojibwe knowledge about climate change could enrich fourth-grade science and social-studies?” The primary purpose is to provide recommendations for educators to update their fourth-grade science and social-studies curricula by including more accurate and thorough representations of Ojibwe knowledge about climate change. Prior to the passage of Act 31 there was very little integration of Ojibwe knowledge into fourth-grade curricula. Although there have been studies of Ojibwe people, curriculum, and climate disruption; no such studies have been done which take Ojibwe Elders’ knowledge of climate change into consideration in content analyses. This study fills gaps among WES curricula, Ojibwe knowledge of climate change, and its impacts on Ojibwe culture. I completed a literature review that explored Ojibwe people and the impact of climate disruption on their culture, including reviews of fourth-grade science and social-studies curricula as related to Ojibwe culture and climate disruption. I used a theoretical framework based on eighteen characteristics of Indigenous cosmology and four commonalities between two models of curriculum (Apple, 1971; Cajete, 1994a).

Design

This qualitative study will include participant observations, interviews, and discourse analyses of curriculum content. It has been divided into three phases, (Figure 5). Each phase is further broken into parts. The figure illustrates each phase of the study as well as individual components.
Figure 5 illustrates the three phases of the study. The schematic shows each phase, in which steps were interconnected and not necessarily done in order.

Phase 1 was an Exploration of Ojibwe people & impact of climate disruption on culture. It took place September 2018 through March 2020, and began with an exploratory experience, Climate Strong! Professional Development Institute that first inspired this study of climate and impact on Ojibwe culture. Additionally, it introduced me to several tribal Elders in Bad River and Red Cliff and allowed me to establish relationships with the two UW-Extension offices working in these tribal communities. In this phase, I also established relationships with the tribal Elder offices and tribal officials in Bad River and Red Cliff bands. This phase also included recruitment of participants.

Phase 2 was data collection from July 2019 to April 2020. The longest part of this phase involved interviews and verifying accuracy of the transcripts with tribal Elders. It included interview with UW Extension Educators, tribal Elders from Bad River and Red Cliff Bands of
Lake Superior Chippewa, and three WES fourth-grade teachers. It also included transcription of interviews and verifying transcript accuracy by participants. Additionally, some Elders were asked to member-check and verify the accuracy of interpretation of interview transcripts. From interview to approval of transcripts took up to six months for some Elders.

Phase 3 comprised data analyses that took place from February 2020 to June 2020. During this phase, I assigned codes to Elder interview data aligned with eighteen characteristics in my model. RTA was completed for Elder, UW-Extension educators and WES fourth-grade educators. A qualitative content analysis (QCA) and critical discourse analysis (CDA) were completed for the fourth-grade science and social-studies curricula. I also compared themes identified by Ojibwe Elders and curriculum delivery of the fourth-grade science and social-studies curricula to determine gaps and possible ways to enrich the curriculum and allow for voice of the Ojibwe Elders.

**Procedures**

**Solicitation & recruitment**

The procedures for recruitment and solicitation varied depending on participant affiliation. (Appendix A) The procedures utilized for recruitment and solicitation for Elders was determined by the Elder director for each tribe. Bad River Elders recruitment took place at the Bad River Elder Center. Flyers and informed-consent form were placed at each table prior to meal time. During meal time I spoke with each table of Elders about the study. I also presented towards the end of the meal each day of recruitment.

Red Cliff Elder recruitment took place at the Red Cliff Elder Center. Flyers and informed-consent form were placed at each table prior to meal time. Although, this was not planned, I helped serve meals each day of recruitment. This turned out to be a great way of
getting to know the Elders and made me feel less awkward as I was there helping. I really enjoyed that time and got to know many of the Red Cliff Elders and Elder Center staff very well. During meal time I presented to the Elders about the research. I then went around the room to answer any questions Elders may have about the study. Additionally, flyers were sent home to home-bound Elders for both Bad River and Red Cliff. One of the participants from Bad River was recruited from the home-bound program.

In the Fall of 2018, I attended a class with the University of Wisconsin - Stevens Point that took place in the Bad River and Red Cliff Tribal Communities. In the summer of 2019, I returned and completed an applied residency to immerse myself in the tribal communities. The Applied Residency was under the direction of the Climate Strong! director who also was a UW Extension educator. Through these experiences I also meet another UW Extension educator. After the applied residency, both were emailed a flyer and informed consent and asked to take part in the study.

In order to recruit WES fourth-grade educators, an email was first sent to the school district’s Director of Student and Educational Services to request permission to reach out to that school. The director then sent an email alerting the fourth-grade teachers and their principal that I would be reaching out to them by email and phone. WES science and social-studies educators were contacted by email and provided a flyer and informed-consent forms. I followed up emails by phone and offered to discuss the project by phone or in person with each school. The original plan for this study was to include two to three teachers from one WES. Due to the difficulty in recruitment and COVID - 19 pandemic, a total of three schools were recruited with one teacher each. (See Appendix A, Table A1).
Informed consent

Informed-consent procedures also varied depending on the participant category. Upon initial contact in person or email, each participant was provided a copy of an informed-consent form or flyer specific to their affiliation (e.g., Bad River Elder, WES, UW-Extension Educator). Appendix A includes copies of each informed consent. Although participants were provided a copy of informed-consent forms during initial contact, they were not required to make decisions at that time. At the time of consent, all participants were provided an additional copy of informed-consent forms. (See Appendix A, Table A2). As the National Aboriginal Health Organization (NAHO, 2019) recommended, “a gift of tobacco is sometimes offered in recognition of the wisdom the Elder will share” (p. 2). Most informed-consent forms for Elders were returned at the time of the interview. At the start of each interview, tobacco was offered to help establish respect between me and each Elder, and to acknowledge and thank them for sharing their wisdom.

Approvals

All parties to this study, including the WES school district, UW-Extension, Bad River Band of Lake Superior Chippewa, Red Cliff Band of Lake Superior Chippewa, and the University of Wisconsin - Stevens Point Institutional Review Board (IRB) have approved this study (Appendix B).

Timeline

A timeline of this study is in Appendix C. The first part of the timeline involved obtaining support from the organizations which I worked with. Letters of support are in Appendix B. To build trust and support from the tribal communities, I participated in the Climate Strong! Professional Development Institute as an exploratory activity in order to
immerse myself in the tribal community. This also provided an opportunity to become familiar with landmarks such as roads, rivers, buildings, and culturally significant locations. In the fall of 2018, I participated in a similar program, but the Climate Strong! experience offered new opportunities that let me extend my knowledge about the tribal communities and learn more about the interactions between the tribal communities, non-Indigenous educators, and the environment as related to climate disruption. Much of this time was spent building trust between me and the tribal communities.

The next part of the timeline involved establishing relationships with each of the affiliations for the study (i.e., tribes, UW-Extension, and WES school district). I began with initial contacts with the tribal Elder offices for both Bad River and Red Cliff, followed by working with these offices to develop procedures for recruitment of Elders for each of their tribes. I also worked with both offices to develop and obtain approval of a recruitment flyer. I also worked with the WES district staff and the UW-Extension deans office to obtain approvals.

Next, I recruited participants during most of the summer of 2019 on Bad River and Red Cliff Reservations. Over that time, I visited both Elder Centers multiple times. At meal times I handed out flyers and informed-consent form, and presented to those attending meals. While at Red Cliff, I also helped hand out meals and during that time I also participated in community events such as the Sandy Lake Memorial, pow wows, community presentations, and fundraisers.

Next, I conducted audio-recorded interviews. The interviews were first completed with UW-Extension, followed by Elders, and lastly the WES educators. Due to the COVID-19 pandemic, the last two WES educators interviews were conducted virtually using Zoom. All
interviews were transcribed using automated transcription with Rev Recorder. Next, I reviewed each transcript and made corrections as necessary. The transcripts were then sent to each participant, reviewed, and revisions made.

Lastly, I completed analyses of interview and curriculum data, in addition to reviews of Ojibwe culture, climate disruption, and a combination of the two. I coded transcripts and reviewed them for themes. Additionally, curriculum was evaluated using QCA and CDA (e.g., Ryan & Bernard, 2000; Saldaña, 2009).

**Data collection**

Table 7 shows data collection for each phase. During Climate Strong! I discussed ways in which UW-Extension participants have worked with tribal communities on climate change. Although, none of the information collected was used as published data it was useful to inform the study and learn about the tribal communities.

No data were collected prior to obtaining informed-consent forms. Data included recorded interviews and hand-written notes. UW Extension educators and Elder interviews were conducted in person. Each participant did one interview and may have meet with me to follow up on the interview either by phone, email, or in person. Coffee and a small snack or meal were provided for each interviewee. This method of data collection was consistent with Indigenous research methods. WES1 was interviewed in person. However, due to the COVID-19 pandemic WES2 and WES3 interviews were conducted by video conference using Zoom.

Documentary data were collected in reviews of science and social-studies curricula. Each WES had several different curriculum resources. However, all three WES had one science source in common, the textbook entitled *HMH Science Dimensions (HMH, 2018)* and one social studies source in common, the textbook entitled *Wisconsin, Our State, Our Story*
(Malone et al., 2008). For this reason, a QCA and CDA were completed for the science text and pages identified by the three WES.

Table 7. Data Collection

<table>
<thead>
<tr>
<th>Part</th>
<th>Method (s)</th>
<th>Form</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Participant-Observation</td>
<td>n.a.*</td>
<td>Exploratory activity.</td>
</tr>
<tr>
<td>2</td>
<td>Interviews</td>
<td>Audio recording &amp; written notes</td>
<td>Elders from the Red Cliff (5) &amp; Bad River (5) Bands of Lake Superior Chippewa were interviewed, focusing on the impact of climate on Ojibwe culture &amp; ways to incorporate this knowledge into science &amp; social-studies curricula. The location(s) were determined by each Elder. (e.g. home, coffee shop). Coding &amp; RTA were completed.</td>
</tr>
<tr>
<td>3</td>
<td>Interviews</td>
<td>Audio recording &amp; written notes</td>
<td>UW-Extension educators (2) that work closely with tribal communities were interviewed, focusing on their role &amp; knowledge of climate change &amp; Ojibwe culture. RTA was completed.</td>
</tr>
<tr>
<td>4</td>
<td>Interviews</td>
<td>Audio recording &amp; written notes</td>
<td>WES teachers (3) from three different schools were interviewed, focusing on current or planned science &amp; social-studies curricula implemented in the WES, as well as inquiry of specifics of the curricula. Interviewees provided access to curricula for the purposes of QCA &amp; CDA. There were also follow up questions regarding the curricula. RTA was completed.</td>
</tr>
<tr>
<td>5</td>
<td>Qualitative Content Analysis &amp; Critical Discourse Analysis (QCA/CDA)</td>
<td>Notes</td>
<td>The fourth-grade curricula were reviewed &amp; QCA &amp; CDA completed.</td>
</tr>
</tbody>
</table>

* n.a. = not applicable
Data security

During the data collection process audio files were uploaded to Rev.com for automated transcription. After my review of the transcripts, completed transcripts were downloaded to my encrypted computer and then uploaded to the UWSP OneDrive. The original audio files and Rev.com files were then deleted after participants verified the accuracy of their transcripts. Handwritten notes were typed and stored on the UWSP OneDrive. The original handwritten notes were shredded and destroyed.

During data analyses, all files were stored in the OneDrive. During coding and analyses, working copies of transcripts were stored on a personal computer with that was password-protected. A list of participants’ names and pseudonyms was stored on the UWSP OneDrive. Only I and my Principal Investigator (PI) had access to that information. Any publications will protect the identities of individuals by using pseudonyms, unless participants explicitly choose to disclose their actual names. For instance, Elders may choose to use their actual names, nicknames, or Ojibwe names.

All data will be downloaded from the OneDrive and stored on an encrypted password-protected flash drive in two locked file cabinets, and maintained for at least seven years. Raw data, transcripts, consent forms, and other materials that may contain identifiers will be stored in a locked file cabinet at my home. Only I and the PI will retain access to the data. After seven years, all data will be destroyed.

Settings

This study took place in five locations. Most locations were within the Red Cliff and Bad River Tribal Communities. In order to be culturally sensitive, Elders were allowed personal choice in the interview location. Interviews with UW-Extension educators were
determined by the interviewee. They choose either their place of employment or a location within the local tribal community. Wisconsin Elementary School (WES) teachers were interviewed at their school or virtually using Zoom. Due to the COVID-19 pandemic, WES 2 and 3 had to be interviewed using Zoom. Table 8 shows the five parts of the study, components, locations, and who determined locations.

*Table 8. Settings*

<table>
<thead>
<tr>
<th>Part</th>
<th>Location</th>
<th>Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exploratory activity at Climate Strong! Professional Development Institute. I was a participant-observer. This included presentations by two Elders. No data was collected for publication.</td>
<td>Red Cliff &amp; Bad River Tribal Communities</td>
</tr>
<tr>
<td>2</td>
<td>Interviews with Bad River &amp; Red Cliff Elders</td>
<td>Bad River &amp; Red Cliff Tribal Community</td>
</tr>
<tr>
<td>3</td>
<td>Interviews with UW-Extension Educators that work with Tribal communities</td>
<td>Bad River &amp; Red Cliff Tribal Communities</td>
</tr>
<tr>
<td>4</td>
<td>Interviews with WES fourth-grade Teachers. Analysis of fourth-grade Science &amp; Social-studies curricula. These interviews were also used to obtain access to &amp; learn about the current curriculum. Curricula was used to complete QCA &amp; CDA in the next part of the study.</td>
<td>WES1 or Zoom</td>
</tr>
<tr>
<td>5</td>
<td>The fourth-grade curricula reviewed &amp; QCA &amp; CDA completed.</td>
<td>n.a.*</td>
</tr>
</tbody>
</table>

* n.a. = not applicable
I participated in the Climate Strong! Professional Development Institute, which is a partnership with the Fond du Lac Tribal and Community College, UW-Extension, Great Lakes Indian Fish and Wildlife Commission (GLIFWC), 1854 Treaty Authority, and Lake Superior National Estuarine Research Reserve. The institute was funded as part of the National Oceanic Atmospheric Administration (NOAA) Climate Resiliency Grant. As stated by the Board of Regents of the University of Wisconsin System (2019), “The Climate Strong! institutes are designed to build capacity among teachers, informal educators, and youth to take action for building community resiliency within the Ojibwe Ceded Territory (Michigan, Wisconsin, and Michigan)” (para 1). The institute applied the G-WOW (i.e., ‘Gikinoo’wizhiwe Onji Waaban’ or Guiding for Tomorrow) climate literacy model and incorporate Ojibwe TEK with culture, language, and leadership to promote climate action.

During this first part of this study, I spent a week assisting, participating, and observing the “Climate Strong! Professional Development Institute.” Although no data were collected in this experience, this exploratory activity informed my research as I learned about the program, spent time learning about climate disruption, impacts on Ojibwe culture, and observed the impacts of climate disruption within the Red Cliff and Bad River communities. I learned about the impacts of climate disruption on Ojibwe culture to a greater depth and was able to converse and reflect about the impacts of climate disruption on Ojibwe culture through ongoing interactions with the project director. According to the Climate Strong! Professional Development Institute Director part to these conversations were focused on “working with tribal partners to bring Indigenous voices into climate change education by integrating culture and science” (personal communication, 2019).
During this program, I heard Elders present about integrating Indigenous ecological knowledge into educational programs such as Climate Strong! The program director also helped me learn more about partnering with tribal Elders (a.k.a. Knowledge Keepers) to bring Indigenous voices into education about climate disruption and science, while integrating Ojibwe culture.

The second setting included interviews with Elders from the Bad River and Red Cliff Bands of the Lake Superior Chippewa. Interviews with Elders took place at a location of their choosing. Examples included: places of cultural significance or significance to climate disruption, personal significance, their home, reservation, tribal office, or any other place of their choosing. The hope was that the Elders would feel more comfortable during the interview. Because the Elders were allowed to choose the location for interviews, these locations varied from person-to-person. Additionally, this provided an opportunity for me to explore the Reservations and better connect to place.

The third setting involved interviews with the UW-Extension educators \((n = 2)\). They were interviewed in the vicinity of the Bad River and Red Cliff Tribal Communities. The locations were set at a location of their choosing. In both cases, the location was somewhere they worked within the tribal communities.

The fourth setting involved the Wisconsin Elementary School (WES) teachers who taught fourth-grade science and social-studies curricula. The three WES schools are located in Southeastern Wisconsin in a large urban school district in which I have taught for the past four years. The first interview took place at the WES. However, as a result of the COVID-19 pandemic, the last two interviews took place virtually using Zoom. Originally, the interviews were planned to take place at each WES so the teachers could more easily access their curricula.
and resources, as well as be more comfortable. However, schools in Wisconsin were shut down the week the remaining two interviews were scheduled.

**Participants**

This study collected data from 15 participants, organized in four categories. (Table 9). The Elders who participated in this study do not represent the knowledge of the entire tribal communities of Bad River and Red Cliff tribal bands. They represented personal knowledge, observations, and perceptions of those that choose to participate in the study as related to climate disruption, culture, and education recommendations.

**Table 9. Participants’ Categories & Demographics**

<table>
<thead>
<tr>
<th>Part</th>
<th>Method</th>
<th>Quantity</th>
<th>Participants</th>
<th>Demographics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Participant-Observation</td>
<td>n.a.*</td>
<td>n.a.*</td>
<td>n.a.*</td>
</tr>
<tr>
<td></td>
<td>Exploratory Activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2A</td>
<td>Interviews</td>
<td>5</td>
<td>Bad River Band of Lake Superior Chippewa Elders</td>
<td>≥ Age 55; 40% Male, 60% Female Other demographics unknown.</td>
</tr>
<tr>
<td>2B</td>
<td>Interviews</td>
<td>5</td>
<td>Red Cliff Band of Lake Superior Chippewa Elders</td>
<td>≥ Age 55; 20% Male, 80% Female Other demographics unknown</td>
</tr>
<tr>
<td>3</td>
<td>Interviews</td>
<td>2</td>
<td>UW-Extension educators who work with tribal communities</td>
<td>Both are White females. Age is unknown.</td>
</tr>
<tr>
<td>4</td>
<td>Interviews</td>
<td>3</td>
<td>WES fourth-grade science &amp; social-studies teachers at three different schools</td>
<td>WES teachers of fourth-grade science &amp; social studies. All were White, females, with at least 16 years teaching experience. Each have</td>
</tr>
</tbody>
</table>
Protocols

Protocols (Appendix D) were as follows:

- Interview protocol for use with Ojibwe Elders;
- Interview protocol for use with UW-Extension educators;
- Interview protocol for use with WES teachers;
- A rubric for RTA; and
- A rubric for QCA and CDA.

Although, no protocol was used during the Climate Strong! program, this experience helped further develop the protocol for the Elder interviews. The greatest benefit of this particular aspect of the study, was not to collect data, but for me to get a feel for the culture within the community (Schensul et al., 1999, p. 91), help me integrate and familiarize with the community (Schensul et al., 1999; Bernard, 1994), and to provided me with opportunities to develop further questions that were asked during later parts of the study.

Ojibwe Elder interviews

The first protocol, semi-structured questions, was limited because I did not want the Elders to get the impression that the research was more interested in the questions than the answers provided. (Blackstone, 2012, p. 4). As Blackstone (2012) suggested, I was willing to
go out of order when needed. Blackstone (2012) also suggested being willing to skip questions if necessary, but that was not required during the Elder interviews. Some questions were selected to encourage storytelling (See Appendix D). The details that are chosen by a storyteller are usually consciously or unconsciously selected based on their experiences that provided insight to what the Elders felt were important (Strauss & Corbin, 1998, p. 18). It was important to not hinder the Elders from storytelling. This required intentional wait time during the interviews. The next portion of the protocol involved questions regarding climate change, impacts on their way of life, and their ability to share stories. It was important that the interviews did not start with sensitive topics, questions or parts of questions. According to Blackstone (2012), controversial questions should not be used at the start of an interview as the participants should be provided an opportunity to warm up and feel comfortable with the interviewer. (p. 5) One important part of this protocol was to ask the Elders if there is a term or phrase for climate disruption. Next, the protocol involved questions that asked the Elders “How would you like the Wisconsin fourth-graders to learn about and know about what is happening? What is most important for them to know, how should that be put into the curriculum?” These questions gave an opportunity for the Elder’s voices to be heard and offer an opportunity to make a difference. Lastly, the protocol provided an opportunity for the Elders to ask any questions they would like or add anything else of their choosing.

**UW-Extension educator interviews**

The second protocol was developed for interviewing the UW-Extension educators. It was based upon my participation in NR-605, Superior Region: Natural Resources, Culture and Climate Change, with UW-Stevens Point. While attending this course, I met and was able to learn a great deal from course instructors and UW-Extension educators. Ki, one of the
participants was the primary organizer of activities for NR-605. She organized the program, helped develop educational models presented, told me stories of connecting between Indigenous and non-Indigenous people, and shared the hardships that the Indigenous people have been facing as a result of climate disruption, particularly the impacts these events have had on Ojibwe culture. I was also introduced or told of other UW-Extension educators that work within the Red Cliff, Bad River, and other communities of Wisconsin. The protocol developed for these interviews included such questions as follows:

- What is your diagnosis of what is happening in the tribal communities in terms of climate change and disruption?
- What has been your role in working with tribal communities to mitigate the impact of climate change and disruption?
- Do you see any ways the UW-Extension can contribute to drawdown of excess carbon?

This protocol was partially inspired by Hawken (2017), who discussed the importance of identifying the problem of climate change, identifying ways to mitigate the problem, and working together to mitigate the problem. For that reason, the UW-Extension educators were also asked “How would you like the Wisconsin fourth-grade students to learn about and know about what is happening around climate change and disruption?, What is most important to know?, How should that be integrated into the curriculum?”

**WES Educator Interviews**

The third protocol was developed for use with WES teachers of science and social-studies in fourth grades. The three WES are located in Southeastern Wisconsin. I work in the
same district where I teach high school science courses. I grew up attending public schools in southeastern Wisconsin and am familiar with the fourth-grade curricula that existed prior to the passing of the 1998 curriculum standards. I recall that very little was taught of Indigenous culture while in the fourth-grade. I also recall how little was taught about climate disruption and that it was mostly taught as hearsay. As a teacher who earned his teaching credentials in Wisconsin post 1989, after the passing of Act 31, I participated in a one-day training to meet the Act 31 requirement. I also recall that this training did little to prepare myself for teaching of Indigenous culture. I have taught at public schools in Southeastern Wisconsin for over 19 years and this protocol was informed by my lack of preparedness and desire to see more integration of Indigenous culture as well as climate disruption within curricula in Wisconsin.

The first set of questions revolved around the teachers training and experiences related to Ojibwe people and climate disruption. The first question was as follows: “What is your background in terms of training, education, and teaching experience related to Ojibwe ecology, culture, and knowledge?” The protocol was designed in such a way, that if Act 31 is not mentioned, that I will bring up that topic. The second question asks of their background, training, education, and teaching experience related to climate change and disruption. The questions which followed focused on the teachers observations related to climate disruption, topics taught related to climate disruption. The next set of questions were focused more on the methods or activities that the teachers utilize related to any of those topics (e.g. filmstrips, fieldtrips, etc.), followed by what resources they use. The exact same questioning was used related to Ojibwe culture, ecology, and knowledge. Next, I asked if they have thought about crossing over curricula between the two ideas and if so, how have they done this? Lastly, they will be asked if they have anything else to add or if they have any questions.
Reflective thematic Analysis

The fourth protocol was developed for RTA. It analyzed the responses to each question looking for themes.

Analysis of curriculum

The fifth set of protocols were developed for QCA and CDA. The tool reviewed one of the curriculum sources used by all three WES and compared the text to curricular models based on the framework the eighteen characteristics (Kimmerer, 2013; LaDuke, 2003; Rice, 2005; Nelson, 2014; Cajete, 1994a) and studies by Apple (1971) and Cajete (1994a).

Cultural Norms

Because I was working with Ojibwe Elders, it was important to consider cultural norms, values, and beliefs that must be considered in a study. Cultural norms that I considered were as follows:

- Time: provided unlimited time if needed for Elders to present and answer interview questions.
- Trust: in preparing for this study, I have spent time immersing myself at times within the Bad River and Red Cliff communities through and during previous coursework. It is important to build trust before studying Indigenous people.
- Location: Allowed for Indigenous people to choose the interview or presentation location. Elders were able to choose a place they were culturally comfortable. This could have been a sacred place, their home, the reservation, somewhere in nature, etc. Allowing them to choose is an Ojibwe way of showing respect.
- Listening: It was important to not interrupt or bring up new ideas when listing to an Elder. From what I have been told, when an Elder speaks you listen as they have very
important knowledge to share. It was also necessary to intentionally add greater wait-time.

- Offering Tobacco: before interviewing or when asking for something of an Elder, it is proper to offer tobacco, one of the sacred medicines. The asema I offered was tobacco wrapped in red tissue paper with red, white, yellow, and black ribbons that represented the four teachings.

- In-person requests: All requests for Elders to participate in the study were done in person because of the importance of building respect and trust.

- Greetings: Upon arriving, Elders were greeted immediately in Anishinaabemowin.

- Reciprocity: Reciprocity has been considered throughout this study and will be considered into the future. I hope to find ways to provide future reciprocity to the tribal communities. A copy of the study to each Elderly Nutrition Program’s office and all Elders that participate upon request. A copy of data will be provided to the Tribal Council upon request. Elders were allowed to ask questions or make additional comments at the end of an interview as a form of reciprocity. Elders were given an opportunity to review transcripts and modify, add, or delete content from the transcripts.

- Thanking Elders: Elders were thanked after agreeing to participate in the study. They were also thanked at the conclusion of interviews and time spent making revisions. All thanks were given in Anishinaabemowin.

Elder interviews began by offering an asema (i.e., tobacco). Anytime asking an Elder to share their wisdom, an asema should be offered. Respect for the participant requires me to tell them who they are and explain why they have this research interest. Chilisa (2012) stated that the participant will most likely provide their lineage story, which will help connect the
participant to myself and the cosmos. Next, I asked “How would you like me to address you? How are you addressed within the community?” This is so that I may properly address the Elder but can also connect to the Elder. Questions which followed focused on their roles in the community and asked if they would like to share their origin base of their tribe. These questions were meant to situate their position within the community and establish a connection to community. In many cases, they also shared how they are connected to their tribal community.

Data Analysis

To analyze data, I used coding, reflexive thematic analysis (RTA), qualitative content analysis (QCA), and critical discourse analysis (CDA). The first step to analysis was to prepare the data for analysis. Audio recordings were transcribed using automated transcription by Rev.com and hand-written notes. Next, I carefully listed to each transcript, correcting any inaccuracies to assure accurate transcriptions. I carefully paid attention to Anishinaabemowin words, in some cases I had to refer to my hand-written notes.

Coding

Each Elder interview was hand coded (Appendix E) for the predetermined eighteen characteristics using printed paper copies of the transcripts. The first step to hand coding was to read each transcript. By reading and looking at all of the data I was able to get a “general sense of the information and an opportunity to reflect on its overall meaning.” (Creswell & Creswell, 2018, p. 193). Hand coding was necessary to better connect with the transcripts and later identify themes. The first coding was done on paper copies. Bazeley (2007) suggested that the first coding was done on hard-copy printouts instead of using a monitor (p. 92). Saldaña (2009) stated that “there is something about manipulating qualitative data on paper and writing codes in pencil that give you more control over and ownership of the work” (p. 22). Graue &
Walsh (1998) said to first “Touch the data…Handling the data gets additional data out of memory and into the record” (p. 145). Hand coding also allowed me to write notes in the margins and record general thoughts about the data (Creswell & Creswell, 2018, p. 193).

Second, data were read a second time and coded line-by-line. Because there were eighteen characteristics being coded, each transcript was read multiple times focusing on different sets of code. Further read throughs were also completed for RTA. After these initial read throughs, I switched to using Microsoft Word comments feature to tag the characteristics. I also made notes of how the words or phrases aligned with each characteristic. For example, if a paragraph was identified as RL (Relationality), I identified the relationship (e.g., more storm surges and negative impacts on wild rice). Or if the Elder’s phrase was identified as RS (Respect), I identified what was being respected (e.g., respect for trees). During the coding process, three emergent additional characteristics were also identified and coded.

When all data was coded line by line in Microsoft Word, Elder interviews data were tabulated in two Microsoft Excel spreadsheets. The first spreadsheet had a tab for each Elder. In each tab were columns with each of the eighteen characteristics plus an additional three that had emerged. All phrases were tabulated with appropriate characteristics. Some coded sentences or phrases may have been tabulated with multiple characteristics. In these instances, phrases or sentences were placed into both columns for the Elder and each of the labeled characteristics. The first spreadsheet allowed me to compare characteristics for each of the Elders and determine if a particular characteristic was more prevalent with a particular Elder.

In a second spreadsheet I created tabs for each of the 21 characteristics. At each tab was a column for each Elder. This spreadsheet allowed me to look at themes and patterns within each characteristic. I could visualize if particular characteristics occurred more often.
OJIBWE CULTURE & CLIMATE CHANGE IN CURRICULA

During this process, I also identified at the start of each cell why that phrase was identified. This allowed me to sort by occurrence.

Reflexive Thematic Analysis

This method was chosen to analyze questions for each group or across groups of participants since “thematic analysis allows you a lot of flexibility in interpreting the data, and allows you to approach large data sets more easily by sorting them into broad themes” (Caulfield, 2020, para. 6). More specifically, RTA developed by Braun and Clarke (2006), utilizing a semantic inductive approach in order to explore the participants opinions and develop themes. Braun and Clarke’s six-steps were used:

- becoming familiar with the data,
- generate initial codes,
- search for themes,
- review themes,
- defining themes, and
- write-up (Maguire & Delahunt, 2017, p. 3354).

RTA was individually done for each question. The first step was to read and re-read the responses to a given question. During this step, I jotted down notes and immediate impressions. Second, I began to organize the data systematically with the interview question in mind, generating codes. Data was tabulated using Microsoft Excel. Step 3 had considerable overlap with step 2. At that time, I began to search for themes. When codes began to fit together, they were identified as themes. Any patterns that were relevant to the research questions were also identified as themes. Step 4 involved reviewing the themes and determining if they make sense, if data supports the themes, modifying themes if necessary, and determining if there are any
subthemes. In some cases, it was determined that the data did not relate to the question asked. Fifth, I “identify[ied] the essence of what each theme is [was] about” (Braun & Clark, 2006, p. 92). In some cases, this involved identifying the relationship between the themes or subthemes. The final step includes the write up in this dissertation.

**Qualitative Content Analysis**

“Most content analyses start with data that are not intended to be analyzed to answer specific research questions” that are generally texts “meant to be read, interpreted, and understood by people other than the analysts” (Krippendorff, 2004, p. 31). QCA was chosen to analyze a common text among the three WES, *HMH Science Dimensions* (HMH, 2018) and *Wisconsin: Our State, Our Story* (Malone et al., 2008). The QCA was completed for *HMH Science Dimensions* by reviewing the NGSS standards to assess alignment with twenty-one characteristics. QCA for the social studies text reviewed text and images using the curricular model’s commonalities of Apple (1971) and Cajete (1994a). This technique involves “systematic reading of texts and symbolic matter not necessarily from an author’s or user’s perspective” (Krippendorff, 2004, p. 3) and allows the use of “a set of procedures to make valid inferences from text” (Weber, 1990, p. 9). The steps I choose to follow included:

- Choosing a body of text;
- Typing the text including image descriptions using Microsoft Word;
- Becoming familiar with the text by reading the text, reviewing images, and footnotes;
- Using the Microsoft Word comment feature, I then coded the text for the presence or absence of each commonality;
- Identifying themes and subthemes in the identified data; and
- Making inferences to answer the research question(s).
Critical Discourse Analysis

Critical Discourse Analysis (CDA) was concurrently used with QCA to analyze the chosen text. CDA was primarily used for the evaluation of hidden curriculum. Van Dijk (1993) stated that “CDA should deal primarily with the discourse dimensions of power abuse and the injustice and inequality that result from it” (p. 252). The text was reviewed the possibility of “subtle, routine, everyday forms of text and talk that appear ‘natural’ and quite ‘acceptable’” (Van Dijk, 1993, p. 254). In the text, I looked for both positive representation the majority group (non-Native) and the negative representation of the others (Van Dijk, 1993, p. 263). The CDA method I choose used three of the critical analysis strategies discussed by Van Dijk (1993):

• Level of specificity and degree of completeness;
• Perspective; and
• Implicitness, implications, presuppositions, and vagueness (pp. 275-277).

In looking at the level of specificity and degree of completeness, I looked to see if there was any irrelevant information that was described at higher levels. I also looked to see if there was any negative categorization of Native Americans in the text that marginalizes the opinions or actions of Native Americans. I also reviewed the text to determine what perspective or point of views were presented, including use of Native or non-Native voice. Lastly, I looked for implicitness, implications, presuppositions and vagueness. I specifically looked for use of modifiers in the written text. This also included looking for portions of the text that included vagueness.
Limitations & Delimitations

This study is limited by its scope of exploring the perceptions of climate change on culture among the Elders participating in the study and the opinions of those Elders in making recommendations to fourth-grade science and social studies curricula. Due to the varying curricula sources utilized by WES educators, the analyzed resources were limited to a common text. Data collected from Elders may not be representative of the entire tribal community. Data collected from educators may not be representative of their affiliations. The stories shared during interviews are critical only for this point in time and place. The study is confined to interviewing those that met the selection criteria for one of the categories of participants. Elders must have been recognized as Elders by the Bad River Band of Lake Superior Chippewa or Red Cliff Band of Lake Superior Chippewa at the time of the interview. UW-Extension educator participants must have worked within those tribal communities. WES educator participants were required to have teaching experiences of science and social studies at the fourth-grade within the selected school district, as well as currently teaching one of the two subjects. The results of this study could be generalizable to educators who teach fourth-grade science or social studies in Southeastern Wisconsin or educators interested in incorporating Ojibwe culture or climate disruption into their curricula.

Reliability & Validity

I tested the validity of my data with the following four steps suggested by Creswell & Creswell (2018, pp. 200-201). First, all participants were provided transcripts to verify accuracy of transcription, with time review, add, delete, or modify their transcripts. Some participants checked up to three transcripts until they approved them. Transcripts and codebooks were checked for inter-rater reliability by an independent researcher. Third, as
Creswell and Creswell (2018) suggested, I spent prolonged time within the Bad River and Red Cliff Tribal communities. I developed strong connections to participants. As Creswell and Creswell stated, “the more experience that a researcher has with participants in their settings, the more accurate or valid will be the findings” (p. 201).

I then double-checked transcripts for accuracy, and codes were checked for shifts in meanings (Creswell & Creswell, 2018, p. 202). For example, I gave special attention to the codes T (truth) and H (honesty). Although these two codes are similar, there were distinct differences when coding (Appendix E). Lastly, an independent researcher verified coding.

Summary

This qualitative study investigated Ojibwe knowledge of climate. Collected data as a participant observer in discussions and activities with Elders, UW-Extension educators, and WES educators. I analyzed interview data using eighteen cultural characteristics and four theoretical commonalities. Fourth-grade science and social-studies curricula were analyzed for present or absent evidence of climate disruption and Ojibwe culture.
Chapter 4. Findings

I interviewed Ojibwe Elders within the Bad River and Red Cliff Bands of Lake Superior Chippewa and UW-Extension Educators that work with those tribal communities to learn how Ojibwe people are impacted by climate disruption, as well as how they relate and talk about climate. I also examined eighteen characteristics of Indigenous people. After conducting interviews with three fourth-grade teachers from separate schools and examining their science and social studies curricula I provided recommendations to help enrich their curricula and align it with Ojibwe knowledge of climate disruption. I also interviewed UW-Extension educators to learn how they work with Indigenous and Non-Indigenous communities. The purpose of this chapter is to present the findings related to the main research question: What are Ojibwe Elders’ and fourth-grade educators’ perceptions of how a more accurate and thorough representation of Ojibwe knowledge about climate change could enrich fourth-grade science and social studies? And present findings of the secondary purposes. I will begin with participants’ stories and WES demographics, followed by the themes, organized in categories. Next, I will provide the findings of analyses associated with the main science and social studies texts. Lastly, I will discuss a common theme found among all three groups of participants.

Participant Profiles

I recruited participants for four groups: five Elders of Bad River Band of Lake Superior Chippewa (BR), five Elders of Red Cliff Band of Lake Superior Chippewa (RC), three WES fourth-grade teachers, and two UW-Extension (UW) educators. Interviews lasted 15 to 106 minutes, averaging 53 minutes. Table 10 summarizes pseudonyms, name meaning, and group for the 15 participants.
Table 10. Participant Profiles

<table>
<thead>
<tr>
<th>Name</th>
<th>Name Meaning</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adikameg</td>
<td>Whitefish</td>
<td>RC</td>
</tr>
<tr>
<td>Bee Pollen</td>
<td>Personal meaning</td>
<td>BR</td>
</tr>
<tr>
<td>Esie</td>
<td>Samoan name</td>
<td>BR</td>
</tr>
<tr>
<td>Flute Player</td>
<td>Personal meaning</td>
<td>WES1</td>
</tr>
<tr>
<td>Gitchigaabo Bebezhigogonshi</td>
<td>A horse that trots</td>
<td>RC</td>
</tr>
<tr>
<td>Guyauhk</td>
<td>Seagull</td>
<td>RC</td>
</tr>
<tr>
<td>Funjikwe</td>
<td>The lady who cooks</td>
<td>UW</td>
</tr>
<tr>
<td>Kalnet</td>
<td>Personal meaning</td>
<td>WES2</td>
</tr>
<tr>
<td>Ki</td>
<td>Personal meaning</td>
<td>UW</td>
</tr>
<tr>
<td>Migizi</td>
<td>Eagle</td>
<td>RC</td>
</tr>
<tr>
<td>Misajidamoo</td>
<td>Gray Squirrel</td>
<td>RC</td>
</tr>
<tr>
<td>Moka Gissis</td>
<td>The Rising Sun</td>
<td>BR</td>
</tr>
<tr>
<td>Morning Star</td>
<td>Personal meaning</td>
<td>BR</td>
</tr>
<tr>
<td>Niigaaniigaabowikwe</td>
<td>Leading women or woman who stands in front of others as if to lead them</td>
<td>BR</td>
</tr>
<tr>
<td>Ursula</td>
<td>Per request, chosen by researcher</td>
<td>WES3</td>
</tr>
</tbody>
</table>

Legend: BR = Bad River Band of Lake Superior Chippewa; RC = Red Cliff Band of Lake Superior Chippewa; UW = UW-Extension; WES = Wisconsin Elementary School

The profiles provide stories of each participant. Although the profiles are laid out in a similar manor, the content varies depending on the participant category. All profiles include narrative voice of the participant. Each starts with the pseudonym and their affiliation, as well as any connection to other participants (i.e., husband or wife). Elder profiles include: extent of familiarity with Anishinaabemowin; story about the participant including their connection to the tribal community, upbringing, community roles, and environmental relationships. WES profiles include: grade and subjects taught, degrees, training, or experiences including those specific related to Native Americans, Act 31, or climate disruption. UW-Extension educator
profiles include: experience with UW-Extension, degrees and training, major roles and contributions within the tribal communities.

Adikameg

Adikameg is a Red Cliff Elder and is married to Misajidamoo. He is not a Native speaker of Anishinaabemowin. His pseudonym comes from the Ojibwe word for whitefish which he fished for most of his life. He grew up in Red Cliff during the Great Depression and his father died when he was fourteen, so he and his seven brothers helped his “ma.” He would do whatever he could to get money growing up including collecting metal on railroad tracks, harvesting, or planting trees. He stated, “We never went hungry growing up.” His family survived by farming the land, raising farm animals, and trading with other families. He has worked as a pulper, factory worker, and spent thirty-five years as a commercial fisherman. Adikameg stated,

I wasn’t very good in school. I went to school, yes. But, I wasn’t very smart in school, but nature, I could do good. You know, that was mine. I could do. I could hunt, I did a lot of stuff I shouldn’t have did some of it. Them days, that’s how you’ve got by.

Even as an adult, he gathered nuts, harvested berries, and raised animals to feed his family. Adikameg stated that his greatest contributions to his community have been teaching people how to “make rice”, trap, and hunt.

Bee Pollen

Bee Pollen is a Bad River Elder. She chose this pseudonym as it has personal meaning.

When asked about the Anishinaabemowin language, she stated:
I don’t know. I never got into the language a lot. My grandmother and mother spoke Native. My grandmother did, but I didn’t know what they were talking about. Stuff we didn’t want to hear.

She stated “my father was listed as Saint Croix tribe. Because it was the lost tribe, he always talked about it. But he was born on a Reservation. So he was practically Bad River, you know.” She grew up in the part of Bad River known as Old Odanah. She lived there until age 10, when her family moved to Milwaukee on the “Old Soo Railroad.” She spent the remainder of her childhood in Milwaukee. She returned to Bad River in 1989. She has been involved in the community including grant writing, Elderly Board, chairman of the advisory board for the Elderly Program, recruitment for the local college Native American program, family preservation program, and she developed a youth program involving service to community and experiential learning. She wrote over 3 million dollars in grants for the tribe. She explained that one of the grants was for the following:

Our program called Zibiquest which means ‘river journey or river,’ you know we’re on the Bad River. We’re applying for a national youth group that we could sell the model. We’re applying for the model program. And I wanted it to be a service learning program. So we had cleaned up the rivers and cleaned up things and helped the elderly and stuff like that. That was all part of it. And part of it was canoeing and kayaking.

She has picked forests, wild flowers, and berries.

Esie

Esie is a Bad River Elder. Her mother was from Bad River and her father was Samoan. She chose her Samoan name for this study. She is originally from Chicago, but moved to Bad
River when she was young. She stated that “I am not a Native speaker. I can speak a little bit. I’m getting better at understanding.” When asked about her roles in the community, she stated,

First of all, I’m a tribal member. And I am an Auntie to a lot of different young people. Some of them I’m blood-related and some of them, you know, related through the lodge; Lodge family, we have a spiritual bond. So my primary role in the community is just being an Auntie and a tribal member.

Other roles have included serving as Social Services Director, advocate for the environment, culture, and language, being involved at both the grassroots and department head levels, and being engaged in internal and external work groups. Esie stated that “part of the community is helping one another” and one of her goals has been “to create our own social service and that reflects who we really are as a people. And a lot of that’s is the language.” She is actively engaged in learning about her culture and language. Esie has been involved in her family’s maple sugar camp but now plans to start her own sugar maple camp to pass on the tradition. And Esie actively harvests wild berries, grapes, plums, and apples.

**Flute Player**

Flute player is a fourth-grade science and social-studies teacher at WES1. She also teaches her students mathematics and English Language Arts that includes reading, writing, and word study. She has lived in Wisconsin her entire life and has been teaching at WES1 for twenty-one years. She has taught fifth grade in the past. She has a degree in elementary education and music. She stated that she has no formal training related to Native Americans, but participated in a one-day workshop while in college to learn about the eleven tribes of Wisconsin. She explained that no one has ever come in to train her on this topic and no opportunities have been offered for outside training. However, she has some familiarity with
Act 31. She has gained some experience by bringing students on one-day field trips to the Wisconsin Historical Society. Until about two or three years ago, there were opportunities for her to take students to a local nature center where they taught the teachers and students about maple sugaring and Native American legends, but funding in the district was cut for this program. She does not have any formal training related to climate disruption, but has taught fifth grade students about the topic during a current events unit. Her training on the topic is limited to environmental science classes she took while in college. She has also made several observations that she attributes to climate disruption.

**Gitchigaabo Bebezhigogonshi**

Gitchigaabo Bebezhigogonshi is a Red Cliff Elder. He has become a local expert of Native Anishinaabemowin. His pseudonym comes from the Ojibwe which means “a horse that trots.” Red Cliff is his home and nature has been his school. He said that he is a huge fan Marlin Perkins, host of the TV show *Mutual of Omaha's Wild Kingdom*; he stated,

> He was kinda like the first guy who really went out and did the animal thing and Mutual of Omaha, but he traveled all over and studied animals, behaviors and this and that. And, I watch some of his videos and I always think, ‘I wonder what he’d think today.’ When he was talking about mountain lions and their habitats and things that are getting diminished. We took out the Appalachian Mountains and took all the mountains out and flattened the Earth.

Gitchigaabo Bebezhigogonshi is involved in the culture, medicine, plants, animals, language, and Ojibwe traditions. He has been involved in hunting and gathering his entire life including collecting and making birch bark baskets, canoes, and drums. He explained,
My focus is to teach at a young age. So I work at the school and I teach a language and culture. And, I take students that want to learn drumming, and I help them participate.

We drum, teaching drumming songs.

He stated that “there’s a lot of teachings that come from that. So you have to know the songs and what does that mean. And when you’re drumming, the sounds.” At the local school he teaches language and culture; he said that he shares his knowledge of traditional crafts such as building drums. He often teaches Ojibwe culture using experiential learning. He assists at the language camp which Elders teach language to young people in traditional ways while beading, making moccasins, harvesting birch bark, and other traditional activities.

_Fungikwe_

Fungikwe is a UW-Extension educator and her she was given this nick name in the community since she studied and mushrooms. She has worked in outdoor education for 23 years and holds a degree in botany. She is a Federally Recognized Tribal Extension Educator Program (FRTEP) educator and explained, “there are many positions across the nation, but only a few East of the Mississippi.” She stated, “we are educators providing. Research based information as well as a connection to the UW System on reservations, usually around agriculture, or youth.” For the past five years she has worked with the Bad River Food Sovereignty Project which is a joint program with the Bad River Band of Lake Superior Chippewa and UW Extension. She serves as the 4-H Youth Development Coordinator. Her primary roles have involved leading nutrition education programs and working with area schools on building and maintaining programs in garden classrooms. She hopes to build resiliency and reduce food insecurity by re-connecting and educating tribal members, including youth and Elders, about their past by showing them how to harvest and prepare wild foods,
such as those grown at the Food Sovereignty Project. At the Food Sovereignty Project J Fungikwe stated:

I teach youth traditional plant harvest and processing of plants for medicine and food using honey and beeswax from the Bad River Food Sovereignty hives as well as assisting community members and GLIFWC educators who teach spring spearfishing, maple syruping, smoking fish and venison and harvesting wild rice.

She also works with Bad River Elders involved in the Elderly Feeding Program. She explained that this program helped “provide more resiliency and true sovereignty and food access.” At this project “we have had to use tools that are directly in response to climate change such as the high tunnel greenhouse” in order to “help regulate things like the torrential rains, the long drawn out dry spells.” She stated that the greenhouse systems are a “modern way of adding resiliency to food production because of climate change.”

**Guyaushk**

Guyaushk is a Red Cliff Elder. He is not a Native speaker of Anishinaabemowin but is familiar with much of the language. Guyaushk tells the story of how was given his Indian name which he is using as his pseudonym:

So in July of 1978 out at Raspberry, an Elder from the Lac Courte Oreilles tribe gave me my spirit or Indian name, which is Guyaushk and that means seagull. So he did it in English and one of our Elders was there and she translated into the Chippewa language. And just before he gave me the name, he says, the name that I'd chosen for you is ‘it rises up to heights, swoops down on the water and looks in search of the land. And he said it's "Guyaushk or seagull.’ And at that exact second, this little girl said ‘look’ and there was in the river there, there was a seagull that was flying by and that seagull and I made
that connection.” Guyaushk grew up in Red Cliff. He went away and earned a Bachelors in Business Administration and Native American Studies. He later earned a Master’s Degree in Organizational Management and a Doctorate in Business Administration. He has spent time in Minnesota, Oklahoma, and Sacramento, but has always returned to Red Cliff. He has worked for the Bureau of Indian Affairs, Indian Health Services, and has worked as a tribal management consultant. He has held positions with the Tribal Council including treasurer, general council member, and Vice Chairman. He recently came out of retirement to serve as Red Cliff Outreach site director for LCO. As part of that role he teaches “Introduction to Ojibwe Culture” and teaches people Native Arts. He does beadwork, makes moccasins, and creates Native figures.

Kalnet

Kalnet is a fourth-grade social-studies teacher at WES2. She also teaches her students mathematics and English Language Arts which includes reading, writing, and phonics. She is part of a PLC in which she teaches social studies, and her PLC colleague teaches the science. She has lived in Wisconsin her entire life and has been teaching at WES2 for sixteen years. She has taught fourth-grade science in the past. She has an undergraduate degree in education with minors in mathematics and language arts. She has a Master’s degree in degree in reading and certificate as a gifted and talented coordinator. Kalnet stated that she was required to take a one semester course on Native Americans when she was in college. It was taught by Native Americans in story form. She is most familiar with the Oneida tribe since she has two friends from there. She also has some Wisconsin specific historical knowledge of the Menominee tribe. She has not had any further training or training offered to her related to Native Americans
since she started teaching. However, she has gained some experience by bringing students to a one-day field trip at the Wisconsin Historical Society.

She has had no coursework or training related to climate disruption, but has taught the districts new science curriculum one time, but explained that it is not aligned with NGSS. She does not have any formal training related to climate disruption. She also mentioned that none of her courses even mentioned climate change but has made several observations that she attributes to climate disruption.

**Ki**

Ki has been an environmental outreach state specialist for UW Extension for seven years and has worked for UW Extension for 37 years in a variety of community development positions. Although she grew up in Milwaukee, she spent much time in the Northwoods and has lived here for most of her life. She has a BS Biology, a Secondary Teaching, and Masters in Natural Resource Management-Environmental Interpretation. She stated that the majority of her is to:

Increase the awareness of climate impacts using Scientific Ecological Knowledge [SEK] and Traditional Ecological Knowledge [TEK], so that people themselves that are in the community can determine their own responses. Because you’re not going to have adaptation unless you have awareness.

Her current position, includes providing “leadership to create educational outreach that empowers youth and adults to address issues affecting the sustainability of natural and cultural resources.” She developed the Gikinoo’wizhiwe Onji Waaban (G-WOW) climate literacy initiative that integrates placed-based evidence and TEK with climate science in partnership with the GLIFWC, the US Forest Service, National Park Service, and area tribes. Also, she is
the director of the Climate Strong! program and conducts professional development climate leadership educator institutes and youth climate camps. She has also secured over $2 million in grants to support climate change and leadership development program development and outreach through collaborations with federal, state, and tribal organizations. Affiliated with her work interests, she stated that “I love nibi (water) and teaching others how to kayak, canoe, and enjoy and cherish it.”

Migizi

Migizi is a Red Cliff Elder. She is not a Native speaker of Anishinaabemowin but recalls some words from her childhood. Her pseudonym has special meaning to her, as it is the Ojibwe word for eagle. She was born in Red Cliff, the daughter of a commercial fisherman. Although her family all lived in Red Cliff, she was raised in the neighboring town of Bayfield. She graduated from the 8th grade. After getting married and having four children, she returned to school to complete her GED and associates degree. She did all of this while working full time. Migizi served many roles within the tribal community. She has served on the study, Tribal Council, personal selection, and education committees. Migizi stated that as a member of the Education Committee it was “more or less a position where I was a liaison between the Tribe and the County, between non-Indigenous and Indigenous people.” She has also worked as a jobs administrator and Great Lakes Inter-Tribal Council. She also got her real estate brokers license to help a fellow tribal member run their rental business. She stated, “a lot of people came to me when they were selling some land on the Reservation. They came to me and asked me to do their appraisal.” For many years she was the head of the Food and Nutrition Resource Center where she lobbied Congress for Indian amendments to the Food Stamp Program for all Tribes in the nation.
Misajidamoo

Misajidamoo is a Red Cliff Elder, but was previously a Bad River tribal member. She is not a Native speaker of Anishinaabemowin. Her pseudonym comes from the Ojibwe word for Gray Squirrel. Upon marrying her first husband, whom was a Red Cliff tribal member, she became part of the Red Cliff Tribe. She was born in Wisconsin Rapids, but spent most of her childhood on a farm in Bad River. She attended and graduated from high school in Ashland. She later went away to Saint Paul Business College where she earned a degree in Business Administration. She and her first husband moved from Red Cliff to Milwaukee where they had two children. Twelve years later she returned to Red Cliff. Upon her return, she began searching out employment with the Tribe. Soon after she meet her second husband, Adikameg, a fisherman from Red Cliff. She has remained in Red Cliff raising her family and devoted time as a mom, grandmother, and serving various roles in the community. Her and Adikameg are avid “natural campers.” She worked as the Tribal Education Director helping students go to college and vocational schools. She also worked for law enforcement where she served as a matron, secretary, and writing proposals for the tribe. She was the first women in Red Cliff to write grants for the tribe. Misajidamoo was appointed by Governor Tommy Thompson to serve on the Wisconsin Act 31 Board.

Moka Gissis

Moka Gissis is a Bad River Elder. He is not a Native speaker of Anishinaabemowin, but knows many words and phrases. His pseudonym comes from the Ojibwe word for “The Rising Sun.” He grew up in the WWII era in the Old Odanah part of Bad River. Old Odanah has since been moved. As Moka Giggis stated:
I grew up in a time of kerosene lamps, wood heat, outhouses. And we hauled our water from the town pumps and we were not road hunters. We’d get into the woods and start tracking and go all day.

Moka Gissis is a member of the Grand Medicine Society called the Midewiwin. Other community roles have included performing ceremonies. Moka Gissis stated,

I do a lot of different ceremonies for people. Prayers before meal is just one example. But in this roundhouse we’ve done many different Ojibwe ceremonies. We do naming ceremonies. People come here for vision quest, to go out and fast. We do a first kill ceremony. That’s one of the rites of passage when the young hunter takes his first big game animal and he’s welcomed into the ranks of the adult hunters. We do ceremonial pipe ceremonies; usually, it’s one of the Elders in that society that has a vision as a result of them coming to you and asking you to take your vows to be initiated into the Midewiwin or Grand Medicine Lodge. And once you do that, that’s quite a responsibility.

He has also done the sweat lodge and Native marriage ceremonies. The only ceremony Moka Gissis has not done is the burial ceremony. He established the Native Studies program at the local college where he was a professor for over forty years. He has held political offices and been actively engaged in grassroots movements for the tribe and environment including climate disruption. He has extensive knowledge of the environment and teaching using Native Tradition.

Morning Star

Morning Star is a Bad River Elder. She is not a Native speaker of Anishinaabemowin, but “knows some words here and there” which she learned from her father. She chose her
OJIBWE CULTURE & CLIMATE CHANGE IN CURRICULA

pseudonym, Morning Star for personal reasons. She was born in Bad River, but her family left the reservation when she was 11 or 12 years old. She met her husband in Milwaukee and always wanted to return to Bad River. Her parents returned to Bad River and in 1975 she followed along with all of her siblings. Morning Star explained,

This is my great-grandfathers allotment. And it’s never been taken out of trust or sold.

It’s important that it was always an allotment and never sold to non-Indians. My father inherited and acquired this allotment through the years from his siblings and other relatives.

With 100% of the land, “he was able to partition amongst his nine children.” She explained that “I own 10 acres and since then I’ve given two acres each to my two daughters. And I gave my son the back five acres.” She stated that “my father was very traditional. He harvested wild rice. He made moccasins, he’d make buckskin. He did beadwork, make outfits, Indian dance, sang at pow wows. He was very, very traditional.” Her mother also did beadwork. Although, she said that she does not get into the woods much, her family has hunted, fished, and gathered berries on the Bad River Reservation. Her father was a wild rice harvester. She buys wild rice from tribal kids and she and her family process the raw rice. Morning Star also does beadwork, makes medallions and teaches beadwork at St. Mary’s Church two times a month. She worked for the Bureau of Indian Affairs (BIA) for 32 years with the Real Property Management Department. While at the BIA she worked with all of the Wisconsin tribes. When she retired she became involved at St. Mary’s Church. And, she is involved in the community as an Elder. She has also served on the Housing Board and has been elected to serve on the Elderly Board as Chairwomen.
NiigaaNiigaabowikwe

NiigaaNiigaabowikwe is a Bad River Elder. Her mother was from Bad River and her father Samoan. Although not Native Speaker, she began learning Ojibwe from her Grandmother when a young child. Her name means “leading women” or “woman who stands in front of others as if to lead them.” She’s originally from Chicago, but returned to Bad River when she was eight years old. Shortly after, her grandmother began sharing knowledge of the culture, language, and traditions. She began making traditional outfits, dancing, and attending powwows. She attended ironworker’s school in Chicago. But she stated, “I didn’t want to go and work over gorges in Washington State so I decided to just go into some construction work here.” NiigaaNiigaabowikwe stated that “I’ve worked in several capacities in the community since I was young. I can go into like all these different things; but a lot I’ve done has been in the environment.” That has included environmental work with the Great Lakes Indian Fish and Wildlife Commission (GLIFWC), conducting waterfowl and deer surveys, hatchery work with the Young Adult Conservation Corps, and “preparing trails and things for the community” with Wisconsin Conservation Corp. She has worked for the tribe’s legal department, Tribal Preservation Office (TPO), and was elected a Tribal Council member two times. She also stated that “I was able to write some grants for my tribal people” as a way to help. NiigaaNiigaabowikwe has “worked as a Tribal Historic Preservation Officer for the past 15 years. Prior to that I worked at another community, but use those skills for my community here.” She stated, My other role in the community, I am fourth degree Midewiwin. And I’m Midewanikwe which is the woman who takes care of the Midewiwin Lodge. Especially the water. So, what does that mean? That means that I’m responsible for taking care of the water, which it means I’m responsible for petitioning the spirit to bless the water.
That’s how we would say it in English. So what I’m responsible for is petitioning the spirit to take care of the spirit to bless that water. I don’t bless the water, it’s not me. But I’m the one who speaks the language to be able to connect with the spirit to be able to ask for that.

**Ursa**

Ursa is a fourth-grade science and social-studies teacher at WES3. She also teaches her students mathematics and English Language Arts which includes reading, writing, and word study. She grew up in Illinois, but has made Wisconsin home for the past twenty-five years. She has been teaching for thirty years. This was her eighth year teaching fourth-grade and seventh year teaching at WES3. She has an undergraduate degree in elementary education and special education EBD. She has a Master’s degree in degree in curriculum and instruction. Ursa stated she has not taken any courses that have discussed or focused on Native Americans. She has not had any further training or training offered to her related to Native Americans since she started teaching. However, she has gained some experience by bringing students to a one-day field trip at the Wisconsin Historical Society. She has had no coursework or training related to climate disruption but has made several observations that she attributes to climate disruption.

**WES Demographics**

The three WES are located in urban school district of Southeastern Wisconsin. In the district there are 13 elementary schools and the three WES that participated in the study represented about one-third of the district’s enrollment in fourth grade. Table 11 shows WES demographics. At the time of this study, the district’s diversity score was 0.64; it was similar for WES 1 and 2, each having a score of 0.64; while WES3 had a diversity score of 0.74. The district as a whole enrolled 37 of 10,188 (0.4%) students who identify as American Indian.
Percentages below 1% will show as zero; therefore, WES may have enrolled students who identified as American Indians but who are not shown in Table 11. WES 1 and 2 enrolled similar percentages of students who were identified as members of designated minority groups (45% & 49%), the same as the district (45%). WES3 reported a higher percentage (72%) of students identified as members of designated minority groups (45% & 49%). Most students identified as members of designated minority groups in WES and the district were identified as either Asian American (16%) or Hispanic American (19%). All three schools reported a student-to-teacher ratios of fifteen or fewer students to one teacher. (Public School Review, 2020) WES1 reported the highest student-to-teacher ratio ([15 / 1] Public School Review, 2020), but reported the lowest student-to-teacher ratio ([10 / 1] Public School Review, 2020).

Table 11. WES & District Demographics

<table>
<thead>
<tr>
<th></th>
<th>District</th>
<th>WES1</th>
<th>WES2</th>
<th>WES3</th>
</tr>
</thead>
<tbody>
<tr>
<td>WES enrollment</td>
<td>10,188</td>
<td>520</td>
<td>302</td>
<td>361</td>
</tr>
<tr>
<td>Fourth-grade enrollment</td>
<td>750</td>
<td>103</td>
<td>59</td>
<td>69</td>
</tr>
<tr>
<td>Student-to-teacher ratio</td>
<td>14:1</td>
<td>15:1</td>
<td>13:1</td>
<td>10:1</td>
</tr>
<tr>
<td>Minority &amp; diversity score</td>
<td>0.64 (45%)</td>
<td>0.65 (49%)</td>
<td>0.65 (48,)</td>
<td>0.74 (72%)</td>
</tr>
</tbody>
</table>

Reported Races & Ethnicities

<table>
<thead>
<tr>
<th></th>
<th>Asian American</th>
<th>Black</th>
<th>Hispanic American</th>
<th>American Indian</th>
<th>Two or more</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16%</td>
<td>5%</td>
<td>9%</td>
<td>0.4%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>27%</td>
<td>3%</td>
<td>12%</td>
<td>0%</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td>22%</td>
<td>3%</td>
<td>19%</td>
<td>0%</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>38%</td>
<td>9%</td>
<td>18%</td>
<td>0%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Themes

An exploration of the eighteen characteristics was the foundation for the theoretical framework. And, a review of the interviews revealed to me a better understanding of Ojibwe ways of knowing to address the primary and secondary goals of the study supporting the
recommendations to improve fourth-grade science and social studies curriculum. Six theme categories emerged during the analyses. See Table 12 for a summary of each theme category including themes and subthemes.

**Table 12. Themes Summary**

<table>
<thead>
<tr>
<th>Category</th>
<th>Themes</th>
<th>Subthemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, Ojibwe ways of knowing</td>
<td>Grandfather’s Teachings</td>
<td>Honesty</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Truth</td>
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<tr>
<td></td>
<td></td>
<td>Respect</td>
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<tr>
<td></td>
<td></td>
<td>Kindness [Love]</td>
</tr>
<tr>
<td>Connecting to the Orders</td>
<td></td>
<td>Kincentrism</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relationality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restorative</td>
</tr>
<tr>
<td>2, Climate disruption</td>
<td>Loss of Reservation</td>
<td>Beaches &amp; shorelines</td>
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<tr>
<td></td>
<td></td>
<td>Flooding or rising water levels</td>
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<tr>
<td>Changing Climate</td>
<td></td>
<td>Precipitation</td>
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<td></td>
<td></td>
<td>Wind</td>
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<tr>
<td></td>
<td></td>
<td>Timing</td>
</tr>
<tr>
<td>Impacts</td>
<td></td>
<td>Plant beings</td>
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<tr>
<td></td>
<td></td>
<td>Animal beings</td>
</tr>
<tr>
<td>3, Most importance</td>
<td>Water</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Everything’s connected</td>
<td></td>
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<tr>
<td></td>
<td>Experience nature &amp; the old ways</td>
<td></td>
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<tr>
<td>4, How to include</td>
<td>Holism</td>
<td></td>
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<td></td>
<td>Inquiry</td>
<td></td>
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<tr>
<td></td>
<td>Experiential learning</td>
<td></td>
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<tr>
<td></td>
<td>Starting early</td>
<td></td>
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<tr>
<td>5, Educator interviews</td>
<td>More experience desired</td>
<td>Ojibwe culture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Climate disruption</td>
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<tr>
<td></td>
<td>Climate disruption’s real</td>
<td></td>
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<tr>
<td></td>
<td>Barriers</td>
<td></td>
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<tr>
<td></td>
<td>Opportunities for enrichment</td>
<td></td>
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<tr>
<td></td>
<td>Start somewhere</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Welcoming opportunities</td>
<td></td>
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<tr>
<td>6, Common theme</td>
<td><em>passim</em></td>
<td><em>passim</em></td>
</tr>
</tbody>
</table>
**Themes of Ojibwe Ways of Knowing**

The eighteen characteristics were predetermined, however, three additional characteristics emerged during analysis, as follows: truth, honesty, and bravery. During the coding process and thematic analysis, seven of the twenty-one characteristics have been designated as subthemes. (Table 13) Each characteristic was present in a minimum of two interviews for each tribe. Nine characteristics were present in every Bad River Elder interview and eleven were present in every Red Cliff Elder interview. These are necessarily the same characteristics for each. At times, Red Cliff presented higher occurrences (e.g. relationality, restorative) because Guyaushk demonstrated these qualities much more in his interview. His interview was also one of the longest interviews.

The selected subthemes were found to be particularly interconnected in each of the themes. And, their occurrences were most relevant to climate disruption. Table 13 shows the number of Elder interviews coded; subthemes represent three of the seven teachings.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Elders</th>
<th>Subtheme</th>
<th>Elders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grandfathers’ Teachings</td>
<td>10</td>
<td>Honesty</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Truth</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Respect</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kindness [Love]</td>
<td>9</td>
</tr>
<tr>
<td>Connecting with the orders</td>
<td>10</td>
<td>Kincentrism</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relationality</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restorative</td>
<td>10</td>
</tr>
</tbody>
</table>

**Theme 1: Grandfathers’ Teachings.**

The seven Grandfathers’ teachings presented frequently in the Elder interviews. Guyaushk stated,
…these seven traditional teachings that I guess in one way would fall under this category of ethics. And understanding and being aware of those, those traditional types of teachings are something that, that can help us in this bigger picture.

Of the eighteen characteristics the most prominent Grandfather’s Teachings were as follows: honesty, truth, and respect; followed by kindness [love], wisdom, and bravery. Of the three emergent characteristics, each was one of Grandfather’s Teachings: honesty and truth, appearing in every Elder interview and bravery appearing in seven interviews. Table 14 shows the number of Elders from each tribe demonstrating each characteristic, as well as occurrences of each.

Niigaaniigaabowikwe explained that “part of that too in the thought process [naming everything on Earth] of that is incorporating our seven values [Grandfather’s Teachings].” After looking at all twenty-one characteristics and their relationships to climate disruption, I determined the subthemes of honesty, kindness [love], truth, and respect were most relevant.

Honesty emerged during the coding process and was present in all ten interviews and coded 50 times. Although, honesty and truth appear very similar, there are distinguishing features. Any of the following would be coded as honesty: doing right thing and saying it; honest to self; or give value to efforts of our own and others. Being honest with self or others was observed several times. For example Migizi stated: “But then I wasn't noticing, I was mainly doing stuff up here and not noticing things [climate impacts] around me.” In an answer by Gitchigaabo Bebezhigogonshi, he explained how he is unsure if his observations are the result of climate change. He stated, “I heard it within the language, but I don't really know it, 'cause we see the climate change and the effects.” Esie made a similar statement, as follows: “There is a lot of change, but I don’t know if that’s attributed to climate change or the weather
or pollution.” However, her quote would have also been coded as truth since she is not deceiving herself or others.

Truth emerged in all ten Elder interviews and was coded 42 times. Any of the following would be coded as truth: having knowledge of cultural teachings; ability to act without regret; knowing who we are in our heart; always seek truth; or do not deceive yourself or others. In an attempt to define climate change, Niigaaniigaabowikwe stated, “So if we were to truthfully say what is climate change, we would have to say it's something that is created by our actions. And we're not doing anything about it.” Many of the comments that were coded as truth involved the participant choosing to not commit to a definitive answer. Often these responses provided alternative possibilities such as other anthropocentric causes such as development or pollution. Morning Star stated,

We used to be able to take big fish; Walleye and Northern out of Wood Creek and we can't do it anymore. I do not know if it's climate change or the development that's upstream in the water and sewer going down it, but we don't see that anymore.

Respect appeared in all ten Elder interviews and was coded 37 times. Any of the following would be coded as respect: thinks of needs of others; mindful of all living things, treats self and others well; may include respect for Earth or resources; Elders or Elder knowledge; traditions, culture or heritage; community; or respect of the orders (i.e., physical world, plant or animal beings). Incorporating stories of culture was common. For example, Moka Giggis tells the story of Great Spirit’s prophecy of the seventh fire. It’s a story of the choice presented to humans as we approach a fork in the road. But it is also a story of respect for both Ma’iingan and the wilderness:
…So, it depends on which path that human beings choose as to what will happen when the next New Age is ushered in. And, it was prophesied that if we get to the point where there's very little wilderness left, Ma'iingan will have no place to retreat when human beings encroach on Ma'iingan's territory he retreats further into the wilderness. The time might come when Ma'iingan will no longer have a place to retreat. If that happens, he'll pass out of existence and so if Ma'iingan passes out of existence, Anishinaabe will soon follow. Anishinaabe will die of great loneliness of our spirit. So Ma'iingan has become a very powerful symbol of what little wilderness that we have left. If Anishinaabe passes out of existence, all humankind will soon follow. And that's where we are right now at this fork in the road.

Several of the interviews referred to respect, not just for nature, but for place. Niigaanigaabowikwe explained her tribes migration story. As they approached the last stopping place on their way to the place where food grows on the water, Bad River. The story illustrates respect for place, nature, culture and the past:

We were just floating in a fog bank. And so, people were getting worried about that. So what we did was that we used our tobacco to be able to ask for help and guidance. And when we did that, this little bird came in front of the boat. And that spiritual leader who prayed for that help and guidance said, follow that bird, it'll take us to where we need to be. And where it took us to was Madeline Island; which is called in our language, Mooningwanekaaning, which is the Yellow-Breasted Woodpecker. So, that is the reason why it was called that. And for that reason it's called that so that we would always remember that journey on our migration journey and what it was that we saw that guided us to this place.
Kindness or love appeared in nine Elder interviews and was coded 24 times. Any of the following would be coded as kindness: caring, sharing, or concern shown. Kindness was seen for the physical world, plant and animal beings, and humans. Gitchigaabo Bebezhi-gonshi stated “No, I, I have friends and myself that, that we look at and talk about those things [survival of the rice]. We want to make sure that the rice is plentiful for everybody.” This statement was coded as kindness and respect for wild rice. Guyaushk told the story of several 300-foot-tall pines being knocked down in a storm. Rather than cutting them up for individuals, the tribe choose to preserve those trees for something special for the entire tribe out of respect for the trees:

And what the tribe did was, put a stop on it for anybody collecting those individually because they wanted to get those pines that were destroyed in that huge windstorm, and to be able to use them for something so that everybody could benefit.

**Theme 2: Connecting with the orders.**

The orders include the physical world, plant beings, animal beings, and human beings. Although connecting with the orders was present throughout the analysis of most characteristics, it was most prevalent related to this study the three subthemes: relationality, kincentrism, and restorative.

Relationality appeared in all ten Elder interviews and was coded 85 times, more than any other characteristic. Any of the following would be coded as relationality: connecting one object or being to another or action; connecting cause and effect; or connecting to place. Most stories that were coded, related to nature or interconnectedness of one being with another being or the physical environment. For example, Esie explained how a river is a living being and ponders the rivers intent: “because the river is a living being, and so is it changing movement
and creating something there? In another example, she relates to wild parsnip and its role: “I think it’s [wild parsnip] really there to protect the other plants cause we can’t get past it to get in there.” In a statement by Niigaaniigaabowikwe, she relates plant beings to each other:

So the other thing that we know is that, plants talk to each other, they communicate with each other and when one plant is getting threatened in an environment; then another plant will come to harbor and protect that plant. So, when we think of it like that, then is a narrowly cattail truly invasive or is it harboring and protecting a seed underneath.

This statement would have also been coded in kincentrism. Guyausk told the story of some Elders he spoke with that demonstrated relationality of the woods and Ojibwe culture: “… doing things in the woods, hunting, fishing, and all of those things that are culturally within our traditions; they're very much a part of it.”

Kincentrism appeared in nine interviews and was coded 51 times. Any of the following would be coded as kincentrism: surroundings viewed as kin; plants, animals, geology or other objects as kin or living beings; Importance of Earth; Connecting to Earth or part of the Earth. Most of the coded stories were about the interconnectedness of nature and connecting with things that the Western world may not consider living, but were reported during the interviews as living. For example, Migizi told the story of fireballs walking on the railroad tracks. After speaking with Brian Rice (Mohawk, Kahnawake Reserve, personal communication, March 5, 2020), he confirmed that he too has heard of these fireballs. Another one of my participants also stated he had heard of them as well. Migizi stated,

My mother used to tell us about fire balls on the railroad track. They'd [parents and grandparents] be going to a dance at the community center. And coming home, they
would have fireballs chasing them. [Mike ask what do you mean by fireball chasing them] They don't know. I don't know. They're just like hopping up the railroad tracks. They would come up the railroad tracks...So it's not just my parents or grandparents, it was all over.

Esie provides another example as she stated, “Because the river is a living being, and so is it changing movement and creating something there.” Several times stories showed me how entuned the Elders were with their environment and how they relied upon plant and animal beings to learn about the environment. Guyauushk stated,

I can remember my mother when my brothers got this deer and they were skinning it, and then she was working on packing up the meat and everything and she said, based on the fat that's on there, she said, ‘we're going to have a long, tough winter.’

Restorative appeared in all ten interviews and was coded 75 times, the second-most coded characteristic. Any of the following would be coded as restorative: Ability to bring back health, strength, or feelings of well-being; or revitalization of culture. Most coding of restorative was associated with revitalization of culture. The interviews provided several examples of how Ojibwe people are fighting for restoring their culture despite climate disruption. Several of the coded examples involved the tribes adapting ceremonies and traditions associated with the orders in order to maintain their culture. Guyauushk stated that “there is a revitalization or comeback and some of these various traditions that were so common then they were almost totally eliminated. But are making a comeback in a lot of different ways.” He explained how the dikinaagan (cradleboard) which is made of birch and cedar is making a comeback:
And again, in our culture in the past, that was something that was used for the newborns. You know, they were placed in there. They were safe, they were comfortable. Of course the non-Indian said that, you know, wasn't good and pretty sooner but kind it out of our culture. But then it's coming back gradually.

Niigaaniigaabowikwe explained climate disruption hasn’t impacted the ability to share stories with the younger generation “yet,” but expressed concern and whether they may revitalize or maintain their culture:

Well, it hasn't yet, but that's been a concern in the back of our minds for our future. You know, how do you talk about Wiigwaas, which is our birch bark, when there's no birch bark. You know, when we talk about, you know, one of the processes; processing wild rice traditionally is to winnow it in a birch bark basket. Now, how do you talk about that when climate change takes all the Birch out of the scenario? And we have to show a picture of birch bark? So what one the things because we're such an adaptable, people we're thinking about finding other communities that are further North that may be conducive to our plants and things like that, or may become conducive to it in the future. And so they might have a bunch of Birch trees somewhere up in Saskatchewan where we can go up there and harvest birch bark. But we won't have any here.
Table 14. Coded Indigenous Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>BR Elders</th>
<th>RC Elders</th>
<th>Total Elders</th>
<th>BR Occurrences</th>
<th>RC Occurrences</th>
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</tbody>
</table>

* emergent characteristic

Themes of climate disruption

Next, to address the primary purpose of the research and provide recommendations for educators to update their social-studies and science curricula by including more accurate and thorough representations of Ojibwe knowledge, particularly about climate change I first examined themes that emerged related to how Ojibwe people are impacted by climate disruption (Secondary Purpose 1), how Ojibwe Elders define climate and how they notice climate is changing and is disrupted (Secondary Purpose 2), and how Ojibwe Elders relate to and talk about climate in terms of their overall ecology, culture, and knowledge traditions
(Secondary Purpose 3). Table 15 shows frequency of occurrences of the three themes and seven subthemes that emerged related to climate disruption during RTA. These themes and subthemes were chosen as they were most common and illustrated the impact climate disruption has had on the identified characteristics.

Table 15. Climate-Disruption Themes

<table>
<thead>
<tr>
<th>Theme</th>
<th>Elders</th>
<th>Subtheme</th>
<th>Elders</th>
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<tbody>
<tr>
<td>Loss of Reservation</td>
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<td>Beaches &amp; shorelines</td>
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<tr>
<td></td>
<td></td>
<td>Flooding or rising water levels</td>
<td>7</td>
</tr>
<tr>
<td>Changing Climate</td>
<td>9</td>
<td>Wind</td>
<td>6</td>
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<tr>
<td></td>
<td></td>
<td>Precipitation</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Timing</td>
<td>6</td>
</tr>
<tr>
<td>Impacts</td>
<td>10</td>
<td>Plant Beings</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Animal Beings</td>
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</tbody>
</table>

Theme 1: Loss of Reservation.

This theme appeared in every Elder interview and includes two subthemes. Eight Elders mentioned the loss of beaches or shoreline (BS) and seven mentioned flooding or rising water levels (FRWL). See Appendix F, Table F1 for additional examples by subtheme. Table 16 summarizes subtheme presence by tribe. Red Cliff Elders reported climate impacting their beaches and shorelines more so than Bad River Elders; five and three respectively. Both tribes discussed the impact of floods in three Bad River Elder interviews, and four Red Cliff Elder interviews. Those Elders that did not discuss flooding ($n = 3$), were females that each self-identified as not as connected with the outdoors. Misajidamoo stated,

We don't have any beaches. The beaches are gone. We used to be able to go to the beaches and go picnicking. And so then the beaches, we can't do that anymore. There's no beaches. Erosion. We took a ride last week and we went to this little place we always
camped [Raspberry]. We're campers, and there's cliffs. Trees are down into the Lake. That's never happened before.

Several also mentioned the loss of places of cultural significance such as ceremonial grounds of fasting sites due to flooding or rising water levels. For example, Niigaaniigaabowikwe explained,

And so now because there was such significant damage over where we normally did ceremonies at, we could no longer hold them there because there's too much risk for children falling off the cliff into the water where there's no beach. We had to move our ceremonies to another location away from the water which we traditionally had it right next to the water in view of Mooningwanekaaning, Madeline Island.

**Theme 2: Changing Climate.**

This theme appeared in nine of the ten interviews. This theme is broken into three subthemes. See Appendix F, Table F2 additional examples by subtheme. The number of Elders that are associated with changes in climate related to precipitation (PPT) excluding flooding, wind (WD) is six, and changes in timing (TM) are seven, six, and six respectively. Changes in timing also included erratic weather events. Red Cliff Elders reported wind as a result of climate change in four interviews and was reported by during two interviews among Bad River Elders. Precipitation was reported by four Bad River Elders and three Red Cliff Elders. Timing was reported by three Elders from each tribe. (Table 16)

Throughout subtheme one, it was mentioned many times that precipitation was more frequent and more amounts of snow and rain. Misajidamoo stated that she used to think there “was less snow, but lately in the last couple of years we’ve had more and more snow” and last
winter it “was up to the top of the windows.” Until recently, Adikameg did not believe in climate change. But now he stated,

I can see the climate is different. We’re warming up. I never believed that before until the last ten years. Cause I can see it in the snow. You get that big heavy wet snow, well the lines go down and all that. Years and years ago, we never seem to get that.

During subtheme one, several mentioned that there is more wind and more frequently stronger than in the past. Gitchigaabo Bebezhigogonshi stated,

It seemed like the wind is getting stronger than what I remember. I mean it was very, very rare that we’d see high winds come through here. And lately it just seems like whenever there’s a thunderstorm or something coming up, we’re advised right away, high winds and we’ve seen the impacts with the winds lately from the Lake.

The third subtheme focused on the timing. This theme also includes fluctuations in climate or predictability. Migizi stated that “I’ve been thinking about that, but what I’ve been seeing and I think we have longer summers and hotter summers.” This was consistently mentioned among other Elders. Elders also mentioned the milder winters. Also mentioned is the erratic temperature swings, fluctuating seasons and timing. Esie explained the impact the “choppy” temperatures have had on her sugarbush:

So that’s what I meant by choppy, up and down change too quickly. So it doesn’t give you enough time to get out there to collect your sap and by the time you get your sap, then it got really cold again for a whole two weeks. And I think, they said that sometimes, then it’s done. It will just quit on you, because it’s erratic. I guess it’s erratic whether.
Gitchigaabo Bebezhigogonshi explained that the limited warm days and drastic weather changes affect your ability to prepare for the changing seasons physically and mentally:

Well, I think, in summertime, you knew it was going to be a warm summer and so you prepared for it mentally. And, lately we didn’t have much of a warm period. I mean we probably had a couple of days this year of warm weather.

<table>
<thead>
<tr>
<th>Subtheme</th>
<th>BR Elders</th>
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**Theme 3: Impact Plants and Animals.**

After a review of GLIFWC’s *Climate change vulnerability assessment*, it was anticipated that some Elders would report impacts on plant and animal beings, but to what extent or alignment with the report was unknown. This theme appeared in all ten Elder interviews. There are two subthemes: plant beings and animal beings. Plant beings appeared in every Bad River and Red Cliff interview (Table 16). All except one Red Cliff Elder mentioned animal beings. I noticed some patterns in terms of gender related to plant and animal being occurrences in interviews. Plant beings were mentioned more often by females, as follows: approximately two and on-half times by males versus three and one-third times by females. Animal beings were mentioned more often by males, as follows: approximately two times by males and one and one-half times by females. These proportions may coincide with the traditional roles of the males and females within the tribes.
I was told 29 stories by Elders of the impact of climate disruption on plant beings and their connection to the animal world. Additionally, I was told a total of 17 stories by Elders animal beings. See Appendix F, Table F3 for additional examples by subtheme. Moka Giggis explained the significance of our position within the orders, as follows:

…the vision of Gichi Manido, the Great Spirit who saw the four orders of creation. The creation occurred in a certain order. First the physical world, then the plant world came after that, then the animal world after that, and finally the human world. And when the human world came into being, they were totally dependent on the first three orders of creation for their very existence. So in order of primacy as human beings, we may be the least important order in the creation.

For this reason, I will first present the subtheme, plant beings, followed by subtheme, animal beings. The subtheme, plant beings appeared in all ten interviews. Since all plants are considered medicines, impacts on medicines related to gathering were also recorded as an impact on plant beings. All Elders mentioned plants, but in addition to mentioning the impact of climate on plants, four Elders also mentioned the impact on medicines.

Although, the animal world relies on the plant world, the “web of life” clearly illustrated the Elders knowledge of the interconnectedness and dependence of plant beings on animal beings. Three Elders explained this to me. Moka Gissis mentioned that “we think the redwing blackbirds controlled the population of worms that could be the cause of the empty hulls. And, Morning Star stated “…because of the beaver, there aren’t many strawberries back there.” Niigaaniigaabowikwe stated, “So they [Perch] are not living long enough and they’re integral in maintaining the rice beds.”
Elders explained to me that climate disruption has impacted their ability to harvest and collect. Some plant beings mentioned included: berries (e.g. strawberries, blueberry), nuts (e.g. hazelnut), Manoomin, trees (e.g., sugar maple & birch), and other wild plants (e.g., wild parsnip, Namepine). Two of the more commonly mentioned plant beings were Manoomin rice, and birch.

Manoomin or wild rice was mentioned to be negatively impacted by six Elders. All five Bad River Elders expressed concern for wild rice and the rice beds. As Morning Star stated “And I think climate change has affected our wild rice. That’s our lifeblood, the sloughs and the wild rice.” Esie explained, “That’s the reason why we’re here because of that rice. And so that is very sacred, it saved up. It save us, that rice.” One concern as stated by Gitchigaabo Bebezhigogonshi:

I worry about that food on the water because: is the water getting too high where it’s killing off the wild rice? Or are the rivers getting too big, where pretty soon though there’ll be no rice? So we’re kind of watching for those things. Looking at the rice. As can be seen, Manoomin is sacred to the Ojibwe people. And, wild rice is more than a plant, it’s medicine. Not all of the concerns are over high water levels, but fluctuating levels. In 2007, water levels hit a record low as explained by Moka Gissis, “2007 was the first time the Bad River Tribal Council had to close the wild ricing season because the rice was growing in mud flats.”

Birch was mentioned by five Elders. They mentioned the importance (e.g. baskets, canoes). Gitchigaabo Bebezhigogonshi stated,

I’ve discussed with people that the trees are getting more stressed. The Birch trees are dying. The bark, we went to go gather bark this past summer and the bark, didn’t come
off like it usually does. We make Birch bark baskets and canoes. And so we’re always
gathering bark and Wiigwaas, and the inner bark.

Migizi explained, “I have noticed. Lot of that [climate change]. The birch. I notice that the
Birch are dying or died. All dying except for the River Birch, they didn’t. The paper Birch all
died.”

Several of the plant beings mentioned are considered important medicines (e.g. wild
rice). The ability to collect medicines was mentioned explicitly several times. For example,
Moka Giggis noticed:

…we had Namepin, that’s wild ginger. That’s one of our medicines. I used to collect it
back there [on his land]. You can’t find it there anymore…I’m just wondering about
certain things. So that’s just one example. So we’re having a harder time finding foods
and medicines and so on then what we did.

Gitchigaabo Bebezhigogonshi explained that “when the marshes get flooded, of course it seeds
back and then it takes a really long time to grow. So both medicines that we’re picking are, not
as abundant as it was.” While participating in Climate Strong! I learned of this idea in Ojibwe
culture that if you don’t use it, it will cease to exist. He explained that they have a dilemma,
should we let them grown so there are more in the future, or should we pick them when they
are there. He stated, “I guess I want to say careful, but yet you kind of wanna pick if it’s there.”

Animal beings were mentioned in several different ways including: negative impacts
of climate disruption, animal beings that are thriving during to climate disruption, impacts on
hunting, and interconnectedness of animal beings with other places and beings.
The only Elder did not mention the impact on animal beings was Migizi who stated: “See, I always worked and my last job was a bookkeeper. I never watch those [Referring to animal beings] around me cause I was working with my head.”

During the interviews, hunting was mentioned several times. Most commonly (seven Elders), the impact on deer were mentioned. Misajidamoo explained that “in this area we have a lot of waawaashkeshki, a lot of deer and the deer populations low.” Gitchigaabo Bebezhigogonshi has “seen a dead deer in the woods probably by either starvation or freezing.” Several animal beings mentioned as being negatively impacted by climate disruption. Rabbit hunting and trapping was also mentioned. Adikameg explained that “back then our hunting was better than it is today. Even though we didn’t hardly have the equipment we have today…I ate so goddamn many rabbits.”

Other impacts on animal beings: fish (e.g. perch), rabbits, muskrats, and waterfowl (e.g. coots), songbirds (e.g. red wing blackbird). Some expressed extreme concern over birds, especially their connection with the wild rice. Niigaaniigaabowikwe mentioned that the impact of climate change is more connected with other places in the globe. For example

So because we have an increased number of hurricanes in the South; we have less birds in the North because it’s happening during their migration from South America up here.

I think identified 272 species are turned well migrating.

Moka Gissis added to the concern over waterfowl and explained how the ecology has drastically changed. He stated:

In Kakagon and Bad River Sloughs, that waterfowl population is probably about 5% of what it was forty years ago. The waterfowl population of ducks, geese, coots have dramatically decreased. I remember right over here on Bad River Slough, where Coots
came in by the thousands. Now you’re lucky to see two dozen in a flock. And I have noticed the same thing with non-game song birds, water birds. You don’t have the variation in species that you used to have. And I’ve seen all of this, in my lifetime. The ecology of the area is changing.

Although most of the mentions of the impact of climate on animal beings was negative, there were some animal beings reported as thriving. This included beavers and bear. Niigaaniiigaabowikwe explained that there are some negative impacts on bears such as “…late denning of bears in their dens in May. The bears are still seen in their dens in May or the end of May. Yeah. So the climate didn’t change for them when it was supposed to. So they stayed in their dens.” Bu, Misajidamoo explained how she believes the bears are benefiting from climate disruptions:

I saw 12 in one day here. I don’t know. There’s a mama bear, which is really strange with three bear babies. And then there was a mama bear with two babies one day here. So we figured that because the weather’s been so good for them, that’s where they’re having more babies.

Morning Star mentioned the increased number of beavers:

But I’ve noticed that there’s a lot of beavers around here. They’ve already been chewing the trees. I can only tell from my own observations…Now you can see a mobile home back there, where you couldn’t see that before and they’re coming closer and closer.

Many of the reported impacts on plant and animal beings aligned with extremely vulnerable as reported in the vulnerability assessment by GLIFWC. This included: wild rice, snowshoe hare [rabbits], perch, walleye, and whitefish. In addition, the Elders mentioned the
impact of several of those identified in the assessment as highly vulnerable. Those mentioned by Elders included: wild ginger, princess pine, muskrat, and lake trout.

Themes of Most Importance

Towards the end of the interview, Elders were asked what was most important that educators teach fourth graders about climate disruption. Although, only asked for the most important thing to be taught, most Elders offered two or more of what they considered most important. Although, several other things were identified as most important (e.g. wild rice, taking action) the three most prominent themes were: everything’s connected, water, and experience nature and the old ways. Table 17 shows the number of Elder interviews coded for each theme.

Table 17. Themes of Most Importance

<table>
<thead>
<tr>
<th>Theme</th>
<th>Elders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>5</td>
</tr>
<tr>
<td>Everything’s connected</td>
<td>5</td>
</tr>
<tr>
<td>Experience nature &amp; the old ways</td>
<td>3</td>
</tr>
</tbody>
</table>

Theme 1: Water.

This theme was most frequently identified as important to Red Cliff Elders (2) and Bad River Elders (3). Overall it was reported as important among Elders in the study (5). This theme includes liquid water, solid water (e.g. glaciers), waterways (e.g. rivers and sloughs), protecting water, and the Bad River water shed, floods. This theme also includes life’s dependence on water, including animal beings and plant beings, especially wild rice. When asked about what is most important to teach, Migizi explained that we need to include a discussion of water levels and effects on animal beings. She stated,
And, I don't wanna live in water. No, that's one thing that could happen. And I guess, I hear on TV that it affects the fish and the heat is affecting the fish. And I know the fish around here, the trout and white fish, they like cold water.

Morning Star’s recommendation focused on the importance of water flowing into sloughs and effects on wild rice and Ojibwe culture. She stated,

Well, I would teach them about Bad River, coming into the sloughs for a wild rice. And I think climate change has affected that where it's affected our wild rice. That's our life blood, the sloughs and the wild rice.

Niigaaniigaabowikwe adds, “I think the most important thing, from my perspective is to teach about the water and how the climate impacts the water and also how that impact ripples out everywhere.”

**Theme 2: Everything’s connected.**

This theme included the interconnectedness Earth, the planets significance to the orders, and the need to protect mother Earth. Five Elders, identified everything’s connected as the most important thing to teach fourth-graders. Of the suggestions by Bad River Elders (4), this was identified most and important. Gitchigaabo Bebezhigogonshi’s sums up most of this theme in his statement,

I think that, this Earth is the most important thing because once it's gone, it's gone. I don't think we should take for granted what we have just because we live here and we can be on our phones or living in our house, all that can be taken away in second if we didn't have trees and we didn't have a way to breathe. I think that's what we need to look. Gets to the orders. So the important part is to know that you're living on Earth; you have to live as one
Theme 3: Experience nature.

This theme included the experiencing the outdoors. Experiencing nature was suggested as most important by three Elders. Adikameg, called it “learning the old way.” Esie, provides an example of how fourth-graders could experience nature. She stated, “Well we could do it easy here. Like we’re gonna go out and look at the trees today to get ready for syrumping in spring.” Niigaaniigaabowikwe provides an example that spans twelve years, not just fourth-grade. This example centered on the use of water tables to teach about changes in the landscape, but she then discusses taking the kids outdoors and choosing a place near the water to study through their years of school. She stated,

And we show how an influx of water is going to change the landscape of an area. Or change or cause a meander in the river. So that is sort of, where they see it, they touch it, they feel it, they can understand it. And if they could see, a snapshot of this one place through a period of time; so say one class takes a snapshot and say in first grade; when you hit 12th grade we want you to come and look at all twelve of these and write a report on what you've seen in the change of that one little area.

Themes of How to Include

Several themes emerged when Elders were asked how to include this in fourth grade curriculum. Often, Elders suggested more than one way. Elders were asked how climate disruption could be included in fourth grade curriculum. Although, several other things were identified as ways of including in the curriculum (e.g. including language, involving tribal Elders) the four most prominent themes were: holism, inquiry, experiential learning, and starting early. Table 18 shows the number of Elder interviews coded for each theme.
Table 18. Themes of How to Include

<table>
<thead>
<tr>
<th>Theme</th>
<th>Elders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holism</td>
<td>6</td>
</tr>
<tr>
<td>Inquiry</td>
<td>4</td>
</tr>
<tr>
<td>Experiential learning</td>
<td>3</td>
</tr>
<tr>
<td>Start early</td>
<td>3</td>
</tr>
</tbody>
</table>

**Theme 1: Holism.**

This theme includes holistically making connections and looking at the Earth holistically, as well as including instruction. Several elders suggested to not look at climate change simplistically, but rather the interconnectedness of the orders. Six Elders, included holism as part of their recommendations for teaching fourth-graders. All but one Bad River Elder mentioned holism in their response. Holism included making connections or holistic approaches. Esie explained,

> You can put it in with food for sure. You could put it in your science class, but you could also put it in the history class. Talk about the historical changes of the weather and how it affected...And um, I guess I look at holistically. One thing, if you impact one thing, it impacts everything.

Morning Stars recommendation illustrates the interconnectedness of water, nutrients, and wild rice. She stated,

> Well, we can teach them about wild rice. And tell it's very abundant and everything's flowing nice when mother nature is working with it. But when the water is flowing into the sloughs and if it doesn't have the nutrients or if there's too much or too little water, it effects wild rice. And if there's not enough water, it will affect the wild rice. So I think climate change in that respect.
Guyausjk’s recommendations illustrate his suggestion for a holistic approach to delivering curriculum. He stated,

And through the STEM: science, technology, engineering, and math. And what one of the tribal colleges is doing and that setting and how they're utilizing the traditional ways of life from this STEM aspect.

Gitchigaabo Bebezhigogonshi stated, “I think power is knowledge. And I think that they are the next generation, they would have insight. So I think I would like to see, yeah, a curriculum built around the base of maybe Aki, our world.”

**Theme 2: Inquiry.**

This theme includes encouraging students to learn something new and triggering their curiosity. It includes hands-on, interactive learning, not just from books. This included activities that let the show or allow students to discover the effects of climate change for themselves. Four Elders suggested inquiry as part of their recommendations for teaching fourth-graders. Guyausjk stated, “But the other part is I'm hoping that a curriculum or something that is developed, but it also includes actual hands-on experience. And it's not just textbook kind of things.” Several Elders, including Gitchigaabo Bebezhigogonshi had stated at one point or another during their interviews their dislike for electronics and what electronics have done to kids. However, even after reporting his dislike for the impact electronics have had on children, Gitchigaabo Bebezhigogonshi suggested a way to include electronics in his recommendations. He stated,

And maybe if there was an app that they [students] could play games and watch a video and then they can get questions, quizzes and so it keeps them engaged. And I think that it would be like a whole series, you know, but the time frame-- How long of a timeframe
is it going to be throughout the whole school year?, Would it be six months? The first part of the year for them? And, then maybe switch it; from the Earth to the water and then do another app where they can explore underwater like ships and the history of Lake Superior, Lake Michigan, and this and that. Have them maybe look forward to those that are coming later.

This example illustrates fluidity and also illustrates how he was thinking holistically, in terms of the entire school year to build excitement for learning by the fourth-graders.

**Theme 3: Experiential learning.**

This theme includes getting the kids out of the classroom to experience and observe climate change. This recommendation was suggested by three Elders. Misajidamoo suggested an outdoor activity allowing fourth-graders to learn about air quality. She later relates this to climate disruption. Misajidamoo stated, “I guess the best thing is to just show them. Just show them and that's about it. You can get an air filter and take it out and there's a difference. You can put it out like for one day.” Adikameg, takes it a step further, and suggests kids get outside and engage in experiential learning, not just at school, but at home. He stated, “parents to get them out. So get the kids outside. You gotta get them out of the house… if you don't go out and do it, you ain't going to learn it.”

**Theme 4: Start early.**

When asked about recommendations for the fourth-grade curriculum, three Elders mentioned that we need to start early, and two Elders suggested starting earlier than fourth-grade. Moka Giggis discussed the importance of starting young, as we are educating our future leaders. He stated,
Well you have to start somewhere and I think they're old enough that they'd start understand what the problems are. And they're going to be our future leaders. So we have educated our young people to stand up for themselves.

*Themes of Educator Interviews*

Three WES interviews and two UW-Extension educator interviews were analyzed, paying most of the attention to the three WES educators. These themes focused on one of the secondary purposes: to assess educators’ understanding and teaching of Ojibwe culture, ecology, and knowledge (i.e., Secondary Purpose #4); so as to make appropriate for educators to update their social-studies and science curricula. Using RTA, I identified four themes. Two of these themes each include two subthemes. These themes and subtheme were identified using RTA. (Table 19). Each theme and subtheme appeared in all Elder interviews.

*Table 19. Themes of Educator Interviews*

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subthemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>More experience desired</td>
<td>Ojibwe culture, Climate disruption</td>
</tr>
<tr>
<td>Climate disruptions real</td>
<td></td>
</tr>
<tr>
<td>Barriers</td>
<td></td>
</tr>
<tr>
<td>Opportunity for enrichment</td>
<td>Start somewhere, Welcoming opportunities</td>
</tr>
</tbody>
</table>

**Theme 1: More experience desired.**

The first theme includes two subthemes: Ojibwe culture and climate disruption. The WES educators came from varying backgrounds, but all three indicated a desire to expand their knowledge of Ojibwe culture and climate disruption. All three have training in elementary education. All three stated, no training in the district, school, or outside opportunities. No experience after college. All three teachers expressed a desire to participate in a focus group where they could learn more about the impacts of climate change on Ojibwe culture. However, due to the COVID-19 pandemic, that portion of the study has been eliminated.
Each WES educator has an undergraduate in elementary education, the exception flute player also has a background in music. Both Kalnet and Ursa have Masters degrees associated with education. They have teaching experience ranging from sixteen to thirty years. All three teachers teach or have taught fourth-grade science and social studies. In the past year, each of them taught social studies and two also taught science. Each is also responsible for teaching mathematics and English Language Arts (ELA) which includes reading, writing, and phonics.

Subtheme 1, Ojibwe culture, illustrates that the experience associated with Ojibwe culture, or even Native Americans is varied and formal training is limited. However, each has experiences from teaching the fourth-grade, field trips, and in some cases experiential learning experiences, but none specifically target Ojibwe people. Each teacher began teaching in Wisconsin after the passing of ACT 31. During the interviews, it was noted that some of the teachers did not realize that the Chippewa were the Ojibwa. Each mentioned that they have never had or been offered the opportunity for training associated with ACT 31 or Native Americans after their initial education or training. Every teacher expressed an interest in learning more about Native Americans and Ojibwe culture.

Ursa is from Illinois and moved here 25 years ago. She stated she was never required or offered any training associated with ACT 31 or Native Americans when she began teaching in Wisconsin. Her training in Illinois did not include any topics related to Ojibwe people or other Native American groups.

Flute Player has always taught in Wisconsin. During her elementary education training, she participated in a one day ACT 31 workshop that covered all eleven Wisconsin tribes. She showed me her ACT 31 materials, but stated that she currently does not use the materials, but “I did in the very beginning, when I was first teaching.” For many years, she took students to
participate in an experiential learning experience involving Native American legends and maple sugaring.

Kalnet has always taught in Wisconsin. In 2000, Kalnet took a full semester course that focused on Native Americans, taught by an instructor by a Native American and as “a large auditorium presentation,” but “the class was told in story form.” She explained that it was not specific to ACT 31, but when she showed up to class was told “you have to take it.” She mentions that some of her knowledge of Wisconsin tribes comes from her visits to a local effigy mound park.

When asking the WES educators about their experience, each teacher, detailed experience gained by taking students on a one-day trip to the local historical society. Every year, fourth-graders in the district take students on this fieldtrip in which students learn about Wisconsin Native Americans. The morning focuses on Native Americans way of life including food, shelter, protection, clothing, ceremonies, and tools. Kalnet explained that the morning focuses on experiential activities such as fire making, basket weaving, making a corn husk doll, using a baby cradleboard, beading, and tool making. The afternoon focuses on fur trade. Flute Player stated the afternoon is spent on the “fur trade and how that affected the Indians and why did they trade…and how it affected their life and why did they change.” The day then concludes with a pow wow. Although, the trip does not solely focus on Ojibwe people, it focuses on Wisconsin tribes.

Additionally, all three WES educators mentioned the experience they have gained through teaching and lessons with students. Although, they each mention that most of the lessons focus on ancient Native Americans and Wisconsin geography. For example, Ursa (WES3) discusses a lesson involving a simulation she developed:
I do four groups and the groups pick their tribe. And I've done this now I think it's for the third year that I've done it, like simulation where they become a tribe and they look up information for their tribe and they do research on their tribe.

Ursa discussed that she has done this project now for three years “But none of my groups have ever picked the Chippewa [Ojibwe]. But we’ve done Menominee, Potawatomi, Ho Chunk and Oneida.” She explained that “we just used a book for them to choose from and it had each of those four groups and then it had Ojibwe. So they could choose one of those five tribes and for some reason that one just hasn't been picked each time.”

Subtheme 2, climate disruption, focuses on the WES educators training and backgrounds associated with climate disruption. Flute Player was the only teacher that mentioned having any classes associated with climate disruption. She had an environmental science class as part of her major. She explained,

…but that was just as fascinating as can be to me but that was 20 some years ago. So, other than that, I mean I’ve had the environmental passion, but not necessarily a ton of training for how to present that. And now with climate change, that’s totally something different again. And, fourth grade has much less opportunity to get at current events and to talk about them.

Flute Player has discussed climate disruption with her students during activities such as planting milkweed with students, discussions of ozone, and indicator species in life science. Each teacher mentioned concerns about the current curriculum used for science. And, that it lacks opportunities to include climate disruption. However, Kalnet and Ursa, state that they have had minimal opportunities to teach students about climate disruption at the fourth-grade. All three teachers have had experience using the Districts primary curriculum resource, *HMH*
Dimensions. However, Kalnet, only taught the new curriculum one year before her Professional Learning Community (PLC) decided that “she [teaching partner] would teach all the science and I [Kalnet] would teach all the social studies.”

A review of the *HMH Dimensions* shows the potential to integrate OC, CC, and KCC into the science curriculum. Flute Player stated that she is only able to cover Unit 1 (Engineering Technology), 3 (Waves and Information Transfer), and 7 (Rocks & Fossils) during the school year, but also stated that she has not been trained on how to present climate disruption into the curriculum. In a review of those three units, Unit 1 and 3 both have the potential to integrate OC, CC, and KCC. Unit 8 has the potential to integrate CC. It would be some work and require some skills and knowledge of Ojibwe culture and climate disruption, but could be done. In fact, a review of the 8 HMH Dimensions units, shows that every unit except 4 (Plant Structures & Function), 5 (Animal Structures & Function), and Unit 7 have obvious potentials presented based on this research. However, including Ojibwe knowledge could potentially be integrated if choosing to address Plant Beings and Animal Beings, but it may be a stretch. Even, if other schools in the district choose other units to teach fourth-graders with the proper training and knowledge of climate disruption and Ojibwe culture, some content could be integrated into science.

**Theme 2: Climate disruption’s real.**

Each WES educator indicated that they have made observations of climate disruption and that it is real. I noticed that the WES educators were more direct in their answers, but did not go into as much depth or provide as numerous examples as the Elders, whereas, the Elders were more likely to present their examples in a circular or spiral story form. Often, I was in anticipation of the Elders full response, sitting on the edge of my seat, like it as if a child
waiting to hear the end of a bedtime story. The WES educators had some details to their examples, but they were not necessarily told in story form, and sometimes appeared to be more of a list.

Each WES educator mentioned the water levels or flooding. Flute Player explained that “I also look at the levels of Lake Michigan. I had a friend who was part of the Great Lakes Coalition because her house fell into Lake Michigan. And this is a number of years back too.” Kalnet explained that in the last couple of years she noticed water levels of the local rivers and Lake Michigan are high. She stated, “I have a friend who has a home on Lake Michigan and the rising of the Lake was so quick one year and it stayed that, to me that’s a drastic change based on climate.” Although, Ursa was not sure about Lake Michigan’s water level, she explained how flooding has been impacting her personally. “It affects me in my house. I’m on three acres and the flooding is really bad…the winters are just a lot of fall type of weather. She explained that she is in a lower area and “I have a farm field right in back of me. And so it kind of drains onto the property.” She recently had to install drain tile underground to collect some of the water and stated, “So hopefully the flooding will be better.”

Flute Player mentioned a few other observations that she attributed to climate disruption. First, she stated, “There’s no spring! [italics added] I mean, I look at that and wonder why that is the way it is.” She also discussed changes in precipitation, stating “Well, I mean the amount of snow, that we used to get compared to what we get now is quite different I think…I just remember it being really, really painful to get places and how there was the winter [Of 1979].” She also explained that when her birthday would arrive in mid-May, she always expected “the weather was going to be warm and plant happy.” And that last year, in 2019 “it was not that way.”
Kalnet’s initial response was, “Do I think that there is climate change? Yes.” Although, she explained that she does not feel she is very “in tuned with climate change…I mean I watch the weather and stuff locally, but I haven’t been in like attuned to it as much as I should of;” she also explained that she may not necessarily be aware of the changes. She also explained that “I’ve had friends who are diagnosed with asthma later in life. I don’t know if that is something to do with climate change,” and explained, “I don’t feel that I’ve been impacted [by climate disruption], as of right now. To be honest, I’m sure I have been, but I’ve not; I think when your living in it, it’s harder to see.”

Ursa’s initial response was “like do I believe in global warming? Yes, definitely.” Besides the her experiencing flooding, she explained, “I think the mild winters that we’ve had for years and years now” are related to climate disruption. And explained, “polar bears dying on the ice flows” and how ice is no longer there for the polar bears and “the polar bears are too far apart.” She also discussed the changing levels of Lake Michigan as possibly related to climate disruption. As she began discussing this example, she said that she wasn’t sure if it was climate disruption, but concluded it was related to increased precipitation:

I don’t know, like the level of Lake Michigan goes up and down, I guess. I don’t know how normal that would have been normally, regularly. We’ve had so much rain instead of snow, so that definitely affects like Michigan level.

**Theme 3: Barriers**

Educators identified four barriers associated with integrating Ojibwe culture and climate disruption into their current curriculum. These barriers included the following: lack of funding or cuts in funding, changing administrator priorities, lack of training, and time. Each educator indicated that they were no longer able to teach science and social studies topics they once
covered. They also explained that Mathematics, ELA, and writing have dominated this time. Table 20 shows time allocation by subject for each WES. They also mentioned that that teachers have lost the opportunity to get kids outdoors and teach topics related to environmental science. As Ursa explained:

Truly it [science and social studies] get butchered the most out of any of our subjects because it’s the two o’clock time and they have assemblies at two o’clock and they have special performances at two o’clock and we don’t have two o’clock on Wednesdays…

Table 20. Time Allocation

<table>
<thead>
<tr>
<th>WES</th>
<th>Educator</th>
<th>Social Studies</th>
<th>Science</th>
<th>ELA*</th>
<th>Mathematics</th>
<th>Gym, Music, &amp; Art</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flute Player</td>
<td>1.9</td>
<td>1.9</td>
<td>6.5</td>
<td>6.25</td>
<td>3.75</td>
</tr>
<tr>
<td>2</td>
<td>Kalnet</td>
<td>1.5</td>
<td>1.5</td>
<td>10</td>
<td>5</td>
<td>3.75</td>
</tr>
<tr>
<td>3</td>
<td>Ursa</td>
<td>2</td>
<td>2</td>
<td>10</td>
<td>6.25</td>
<td>3.75</td>
</tr>
</tbody>
</table>

* includes reading, writing, word study, phonics

For example, Flute Player, indicated that her school used to be one of the biggest Arbor Day advocates in the district. And, “none of that happens anymore” explained, “We don’t have time for that anymore. That is great concern to me because there’s no connection to Mother Earth, there’s no connection to respect.” Although, she stated that she is able to discuss some topics related to plants, animals, and current events, “there’s just so little in the curriculum” because of time.

One of the barriers indicated by Kalnet is the HMH curriculum. Although, my literature review indicated the potential to integrate climate disruption and Ojibwe culture, she discussed her previous knowledge of NGSS and teaching science with the HMH curriculum. She described the curriculum as “it’s horrible” although she did mention she only used the curriculum one year. She stated “Those [HMH books] are supposed to be aligned with the NGSS. And I know I taught the National Standards a couple of years ago on my own and it
was much different than what the books have. I don’t know.” She used the curriculum when it was first adopted by the district and perhaps additional training may reduce this barrier. During the QCA of the *HMH Dimensions Curriculum* I will further address this particular barrier.

Ursa indicated that this year, the COVID-19 pandemic, was a barrier affecting what material was able to be covered. Ursa explained, “I would have chosen to end the year with ‘Our changing Earth’ which includes things such as climate change and weather…at least a few weeks of that” if not for COVID-19. She also discussed the HMH Dimensions Curriculum as a barrier. She explained that “there’s two whopping big books that they do very little in because again, you could do it every single day of the school year and not cover both of those books.” She also indicated that “The reading is too hard” and that she teaches at a school “which is a low income school. Most of it is too hard for my kids to understand. And it took all the joy out of science because it took away all the experiments.” She discussed several experiments with me that she does do with the students and “none of those are in there.” She does state that:

- it has some good features, it does have some things to make the kids think and it links everything to real life...And so I like that it does things like that. The problems that are posed are authentic problems, but it just is not real user friendly for especially my kind of kids that I have.”

**Theme 4: Promising opportunities.**

Theme 4 includes two subthemes: start somewhere and welcoming opportunities. This theme demonstrated the extensive knowledge of the craft of education help by the WES educators. Promising opportunities to enrich the curriculum by Indigenous voice, Ojibwe
culture, climate disruption, and the impacts climate has had on Ojibwe culture became apparent during the analysis.

The subtheme, start somewhere, is as it sounds. Although, WES educators may not have reported teaching lessons on climate disruption or Ojibwe culture in their curriculum, each identified initial steps to address both climate disruption and Ojibwe culture. Each WES teacher reported taking fourth-grade students each year to the local historical society museum when they learn about Native Americans. Although, each reported not feeling they were doing much to address Ojibwe culture or climate disruption, each of them has already included some of each of these. In some cases, it may only be a small part, but each started somewhere. In some cases WES teachers were unaware they were already doing lessons associated with climate disruption. In other cases, such as Ursa, she stated “So I would’ve chosen to end the year [If not for COVID-19] with Our changing earth which includes things such as climate change and weather.”

The second subtheme, welcoming opportunities, is a key subtheme in the study. Each teacher indicated they welcome the opportunity to include climate disruption and Ojibwe culture. They also indicated a willingness to have guidance or training for this process, and interest in opening a dialogue with UW-Extension educators and Ojibwe Elders. However, each indicated that the priority of ELA and mathematics continues to be a barrier to modify curriculum. However, when told that there may be a way to add to the curriculum with interdisciplinary lessons that do not take away from math or ELA, each WES educator welcomed the opportunity. When asking the teachers about their willingness to include climate disruption, Ojibwe culture, or Ojibwe knowledge of climate disruption, they each affirmed their interest and provided examples of how they already include Ojibwe culture. They stated
that they welcome inclusion of the twenty-one characteristics of this study’s theoretical framework.

- Ursa: “we already talk quite a bit about how they [Native Americans] value nature and that they believe that they’re part of nature. They’re an equal part of it. They’re not above it.”

- Flute Player: “I make kind of a big deal about how Native American culture, even to this day, the thinking is very different from, you know, throwaway…the belief system is that animal sacrificed itself for you, which means you are grateful.”

- Kelnet: “We talk about the Mackinac Island, and how it was formed on the back of a tortoise shell or turtle shell. So we are talking about it throughout the year…you’re just making me think about how to incorporate this and the Ojibwa, just including that and the just the historical part of it. The background, the climate change. Yeah, I could totally see doing it.”

WES educators said that they did not feel that the HMH curriculum includes climate change. A review of the text revealed some opportunities to include both climate disruption and Ojibwe culture. Teachers expressed a willingness to learn how to better use the text and include crossover methods to tie the science, social studies, and the topics of this research.

**Science & Social Studies Curriculum**

This section addresses: analyzing science and social studies texts for evidence of Ojibwe ecology, culture, and knowledge about climate and climate change (Secondary Purpose 5). During interviews with the three WES, there were varied sources of curricula utilized to teach students science and social studies. In this section I will discuss the text and resources used by the WES educators and present the results of analyses of the primary curriculum sources used
at all three WES. The analyses of the science text, *HMH Dimensions* (HMH, 2018) were completed using QCA along with the twenty-one characteristics and data obtained during interviews. And, analyses of the social studies text, *Wisconsin: Our State, Our Story* (Malone et al., 2008) were completed using CDA and QCA along with the Apple and Cajete curricula models and using the twenty-one characteristics.

**Science Curriculum**

*HMH Dimensions* was reviewed for the potential to incorporate Ojibwe knowledge and climate disruption. As previously discussed, teachers indicated that time a major constraint for incorporating those two concepts. They also discussed the concerns about the HMH *Dimensions* and possibly being misaligned with the NGSS. However, previous studies have reported that students make gains associated with the designed curriculum. The WES teachers reported there is a lot to the curriculum. WES teachers also reported that since there is so much to the curriculum, teachers choose what parts to use. Ursa stated “So every teacher in the district now, they’re just choosing whatever they want to do [science curriculum].” QCA was completed to determine if this curriculum could be used to meet the goals of this study.

WES educators reported different combination of units covered in the *HMH Dimensions*. Flute Player covers units 1, 3, and 7. Kalnet’s science teacher counter-part covers Units 1, 2, 4, and parts of 5. Ursa covers parts of 1, 2, 5, 6, and 8. Since it is unknown what units are taught by the other ten elementary schools in the school district an analysis was completed for each of the eight units. Detailed recommendations will be provided during in Chapter 5 and Appendix G, Tables G1-G8.

Each of the eight units are organized into eight units. My analysis found that the teachers edition does include the NGSS Disciplinary Core Ideas (DCI), Science and Engineering
OJIBWE CULTURE & CLIMATE CHANGE IN CURRICULA

Practices (SEP), and Crosscutting Concepts (CCC). In addition, each unit included ways for students to engage, explore/explain, elaborate, and evaluate. Incorporated into each unit are lessons including ideas for hands-on activities. It also included suggestions for differentiated instruction at three levels, as follows: on-level readers, extra support, and enrichment. Claims, Evidence, and Reasoning (CER) is also embedded in each unit. Lastly, the teachers edition included connections to math and ELA. The analysis revealed that each of the eight units has the potential to include OC, CC, and KCC.

Analysis of Social Studies Curriculum

The WES teachers reported using a variety of resources and pedagogies to teach social studies curriculum. No one teacher used the exact same resources, with the exception, each teacher reported using Wisconsin: Our State, Our Story (Malone et al. 2008) and taking students to the local historical society for a day to learn about Native Americans of Wisconsin. Additional resources included the following:

- Other Texts (e.g. *Indian nations of Wisconsin* (Loew, 2013);
- Online videos, mostly You Tube;
- Children’s literature;
- Games and puzzles; and
- Maps.

Student and teacher centered pedagogies included the following:

- Reading by the teacher or student, or use of read a louds;
- Interpreting or creating diagrams and charts;
- WebQuests and student research;
- Class discussion;
• Student created posters, slideshows, and presentations; and
• Tribal simulations.

Analyses of *Wisconsin: Our State, Our Story* (Malone et al., 2008), using the curricular models were completed following participant interviews. The traits in the curriculum models were analyzed using CDA and QCA, with the following three exceptions:

• Agenda driven by curriculum;
• Government controls curriculum by influencing educators; and
• Educators view textbooks as curriculum.

Those three traits would require additional questioning of school district staff and participants.

The data is displayed as four tables: Apple’s model and traits (Table 21), Cajete’s model and traits (Table 22), commonality traits (Table 23), and twenty-one characteristics (Table 24). Although the data were analyzed using qualitative methods, I made comparisons for each of the traits and groups of data. Each participating teacher covered different pages and number of pages, therefore, a rate was assigned, indicating the approximate occurrence of the trait per page. Rates allowed me to compare the occurrence of a trait between each WES and the pages reported used by all three WES, and to compare rates between the three parts of the curricula model: Apple, Cajete, and commonality. Also, I was able to do a rate comparison for each way of knowing, expanding the findings associated with that trait in Cajete’s model.

Each participating teacher reported pages covered when teaching social studies. Flute Player (WES1), reported using twenty-two pages of the text. She uses the last two pages for the chapter titled, Wisconsin: a place with a past and all of chapter three, titled Wisconsin’s first people. Kalnet (WES2), reported using forty pages. She uses all of Chapters 3 and 4. Chapter 4 is titled, The Fur Trade Era: exploration and exchange in Wisconsin. Ursa (WES3),
reported using six pages at the beginning of Chapter 3. However, Ursa explained that the students do use portions of the text, including maps for research on tribes and to become familiar with parts of a text.

Of the four Apple traits analyzed, Western systems appeared most frequently among all selected text \( (M = 0.50) \), with the greatest rate in WES3’s text \( (M = 0.67) \). A passage was noted as Western system if the word or context was not aligned with my observations of the ways of knowing. One of the common occurrences was the reference to plants or animals as resources. The trait of superficial multiculturalism appeared with each WES selected text \( (M = 0.34) \). Most often these instances were sentences that mentioned an aspect of Native culture, but did not provide details. Use of power and knowledge \( (M = 0.23) \), as well as books not neutral \( (M = 0.20) \) appeared least often. Table 21 shows a tabulation of these means.

Table 21. Mean Appearances of the Apple Curriculum Model

<table>
<thead>
<tr>
<th>Trait</th>
<th>WES1</th>
<th>WES2</th>
<th>WES3</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power &amp; knowledge</td>
<td>0.14</td>
<td>0.23</td>
<td></td>
<td>0.23</td>
</tr>
<tr>
<td>Books not neutral</td>
<td>0.05</td>
<td>0.23</td>
<td></td>
<td>0.20</td>
</tr>
<tr>
<td>Superficial multiculturalism</td>
<td>0.50</td>
<td>0.35</td>
<td>0.50</td>
<td>0.34</td>
</tr>
<tr>
<td>Western system</td>
<td>0.59</td>
<td>0.55</td>
<td>0.67</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Of the eight Cajete traits analyzed (See Table 22), the most common traits were as follows:

- Cosmology;
- Indigenous and western mixed; and
- Indigenous systems.

Each trait was counted approximately 0.5 times per page. Although, each Cajete trait appeared to some extent for selected pages for WES 1 and 2, only cosmology and ways of knowing appeared in all three WES. The least common trait was understanding the Earth \( (M = 0.11) \),
followed by stories, nature, experiences are curriculum ($M = 0.18$) and need intellectual bridges, ($M = 0.18$).

The strongest pattern observed is ways of knowing ($M = 1.84$). Ways of knowing appeared at WES1 ($M= 3.05$) and for WES2 ($M = 1.85$). Table 22 shows a tabulation of these means.

**Table 22. Mean Appearances of Cajete Curriculum Model**

<table>
<thead>
<tr>
<th>Trait</th>
<th>WES1</th>
<th>WES2</th>
<th>WES3</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cosmology</td>
<td>0.86</td>
<td>0.50</td>
<td>0.33</td>
<td>0.53</td>
</tr>
<tr>
<td>Ways of knowing</td>
<td>3.05</td>
<td>1.85</td>
<td>0.83</td>
<td>1.84</td>
</tr>
<tr>
<td>Honors Indigenous Knowledge</td>
<td>0.36</td>
<td>0.28</td>
<td></td>
<td>0.27</td>
</tr>
<tr>
<td>Stories, nature, experiences are curriculum</td>
<td>0.32</td>
<td>0.32</td>
<td></td>
<td>0.18</td>
</tr>
<tr>
<td>Indigenous &amp; western mixed</td>
<td>0.64</td>
<td>0.58</td>
<td></td>
<td>0.55</td>
</tr>
<tr>
<td>Need intellectual bridges</td>
<td>0.14</td>
<td>0.18</td>
<td></td>
<td>0.18</td>
</tr>
<tr>
<td>Indigenous system</td>
<td>0.91</td>
<td>0.63</td>
<td></td>
<td>0.59</td>
</tr>
<tr>
<td>Informed by Indigenous people</td>
<td>0.23</td>
<td>0.23</td>
<td></td>
<td>0.23</td>
</tr>
<tr>
<td>Understanding of Earth</td>
<td>0.09</td>
<td>0.13</td>
<td></td>
<td>0.11</td>
</tr>
</tbody>
</table>

Four commonalities were analyzed. (See Table 23) Cajete and Apple both are in favor of curriculum that has the first three traits. The fourth trait, hidden curriculum, was analyzed for its presence, but Cajete and Apple both state should not be present. The first pattern noticed is that hidden curriculum was noted at 0.05 or less. The strongest trait was the importance of place. WES3’s pages showed minimal importance of place ($M = 0.17$), but both WES 1 and 3 showed 0.50. Although importance of place averaged higher for all pages, multiculturalism appeared relatively high for all three schools.

**Table 23. Patterns of Commonalities**

<table>
<thead>
<tr>
<th>Trait</th>
<th>WES1</th>
<th>WES2</th>
<th>WES3</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiculturalism</td>
<td>0.95</td>
<td>0.65</td>
<td>0.50</td>
<td>0.61</td>
</tr>
<tr>
<td>Importance of Place</td>
<td>1.23</td>
<td>0.78</td>
<td>0.17</td>
<td>0.84</td>
</tr>
<tr>
<td>Curriculum through eyes of oppressed</td>
<td>0.32</td>
<td>0.25</td>
<td>0.50</td>
<td>0.23</td>
</tr>
<tr>
<td>Hidden curriculum *</td>
<td></td>
<td></td>
<td>0.05</td>
<td>0.05</td>
</tr>
</tbody>
</table>

*in this model as to be avoided
The greatest discourse observed was hidden curriculum or lost opportunities in the selected text of *Wisconsin: Our State Our Story* (Malone et al., 2018). A total of 17 lost opportunities were notes during the analyses. These were most often coded as superficial multiculturalism, Western system, hidden curriculum, or books not neutral. And, in some cases, they were not coded as any of the traits. For example, in the text, they discuss wild rice several times, but never mention the sacred significance of wild rice (p. 62). The mentioning of plants or animals as resources is another example (p. 62). In another example, the text discusses exploration of the Mississippi River by an explorer, but does not discuss that the Mississippi was previously traveled by Native Americans, however, it does discuss Native Americans traveling the Wisconsin River until they reached the Mississippi River (pp. 64-66).

The next part of the analyses involved a review of ways of knowing under the Cajete model. To further analyzed this trait, I analyzed each of the eighty-one times ways of knowing was coded during the selected pages of the text. The passage associated with that instance of ways of knowing was then reviewed to determine which of the twenty-one characteristics it was associated with. In some cases, a passage may have been coded for more than one characteristic. Among the forty-four pages of text analyzed, ways of knowing trait was occurred 81times and coded for a characteristic 181 times. Table 24 shows a summary of this analysis.

In all of the selected pages, the four highest occurrences overall, were wisdom \(M = 0.77\), survival \(M = 0.75\), kincentrism \(M = 0.64\), and fluidity \(M = 0.48\). I next analyzed how often a characteristic tends to appear in each of the WES selected text. On average, a characteristic occurs 6.86 times per page for WES1’s selected text, 4.18 times per page for WES2, and 4.27 times per page for WES3. When considering the entire selected text
(pp. 38 - 79), characteristics appear approximately 4.11 times per page. The last part of the analysis involved comparing the rate of occurrences of the twenty-one characteristics between the selected pages for each of the three chapters. When doing a comparison of selected pages for Chapters 2, 3, and 4, the rates of occurrence for the characteristics was highest for Chapter 3: Wisconsin’s First People, a rate of approximately 7.1.

Table 24. Characteristics in Ways-of-Knowing Trait

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>WES1</th>
<th>WES2</th>
<th>WES3</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance</td>
<td>0.32</td>
<td>0.20</td>
<td>0.17</td>
<td>0.20</td>
</tr>
<tr>
<td>Bravery</td>
<td>0.05</td>
<td>0.03</td>
<td></td>
<td>0.02</td>
</tr>
<tr>
<td>Cyclical &amp; Spiral</td>
<td>0.14</td>
<td>0.08</td>
<td>0.17</td>
<td>0.09</td>
</tr>
<tr>
<td>Fluidity</td>
<td>0.77</td>
<td>0.50</td>
<td>1.33</td>
<td>0.48</td>
</tr>
<tr>
<td>Gratitude</td>
<td>0.09</td>
<td>0.03</td>
<td></td>
<td>0.05</td>
</tr>
<tr>
<td>Harmonious</td>
<td>0.32</td>
<td>0.18</td>
<td>0.17</td>
<td>0.18</td>
</tr>
<tr>
<td>Coexistence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holistic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honesty</td>
<td>0.05</td>
<td>0.03</td>
<td></td>
<td>0.02</td>
</tr>
<tr>
<td>Humility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kincentrism</td>
<td>1.18</td>
<td>0.55</td>
<td>0.50</td>
<td>0.64</td>
</tr>
<tr>
<td>Kindness [Love]</td>
<td>0.09</td>
<td>0.05</td>
<td></td>
<td>0.07</td>
</tr>
<tr>
<td>Liberty</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oneness</td>
<td>0.64</td>
<td>0.35</td>
<td>0.17</td>
<td>0.34</td>
</tr>
<tr>
<td>Reciprocity</td>
<td></td>
<td>0.15</td>
<td></td>
<td>0.14</td>
</tr>
<tr>
<td>Relationality</td>
<td>0.32</td>
<td>0.15</td>
<td>0.33</td>
<td>0.16</td>
</tr>
<tr>
<td>Respect</td>
<td>0.05</td>
<td>0.03</td>
<td></td>
<td>0.02</td>
</tr>
<tr>
<td>Restorative</td>
<td>0.05</td>
<td>0.05</td>
<td>0.17</td>
<td>0.05</td>
</tr>
<tr>
<td>Sharing</td>
<td>0.23</td>
<td>0.15</td>
<td>0.17</td>
<td>0.14</td>
</tr>
<tr>
<td>Survival</td>
<td>1.23</td>
<td>0.83</td>
<td>0.50</td>
<td>0.75</td>
</tr>
<tr>
<td>Truth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wisdom</td>
<td>1.36</td>
<td>0.85</td>
<td>0.50</td>
<td>0.77</td>
</tr>
<tr>
<td>All Characteristics</td>
<td>6.86</td>
<td>4.18</td>
<td>4.27</td>
<td>4.11</td>
</tr>
</tbody>
</table>

The last pattern that was observed during the analyses was the inclusion of changes in climate and Native Americans. It was reported by the WES teachers that the book did not
include climate disruption. However, it was noted seven times in the selected pages. A couple of the examples were introductions to the chapter, and one of the examples was a discussion question, “How did the lives of Wisconsin Indians change as the climate warmed?” (p. 39)

Some examples are listed below:

- “As the climate warmed up, plant and animal life changed. The ways people lived changed too. You will recognize these changes as you read through the chapter.” (p. 40)
- “Many tribes and groups of Paleo-Indians lived in Wisconsin during this period. The climate was much colder then. Few edible plants were growing, Paleo people had to travel far and wide to find enough food to survive.” (p. 45)
- “About 9,000 years ago, the climate in Wisconsin became much warmer and drier — even warmer and drier than it is today. Oak trees began to replace pine forests in the southern part of the state. Mammoths and mastodons disappeared forever.” (p. 46)

**Common theme**

One theme or common goal appeared in data from all participants, to connect with each other and help bridge the gap of climate disruption, Ojibwe culture, and fourth-grade curricula. The Elders indicated throughout their interviews that there is a need to connect with younger people and share Elder knowledge with the WES and students. WES educators expressed an interest in connecting with UW-Extension educators and tribal Elders to enrich the fourth-grade curriculum. And, UW-Extension educators have indicated an interest in working with both Bad River and Red Cliff tribal communities, as well as, fourth-grade educators. Additionally, the UW-Extension educators have extensive experience working with Indigenous and
non-Indigenous communities. They stated that they would also be willing to provide educational and experiential learning resources they have already developed, as well as be interested in helping further develop curriculum aligned with the goals of this study.

**Summary**

In this chapter, I presented participants’ stories and WES demographics. I next presented findings related to the main research question: What are Ojibwe Elders’ and fourth-grade educators’ perceptions of how a more accurate and thorough representation of Ojibwe knowledge about climate change could enrich fourth-grade science and social studies? and secondary purposes. I found themes and subthemes in analyses of data from Elder interviews that addressed ways of knowing, climate disruption, and recommendations. Next, I found themes and subthemes in analyses of data from interviews with participating educators at the three Wisconsin elementary schools. I then analyzed science and social-studies texts used at participating schools. Lastly, I found a theme that common to all participants.
Chapter 5. Key Findings, Discussion, & Recommendations

This study draws from Indigenous theories and Indigenous cosmology through an examination of Indigenous worldviews, Ojibwe ways of knowing and curricular models of Apple and Cajete. Interviews were conducted with Ojibwe Elders, UW-Extension educators, and WES educators to make recommendations to better represent fourth-grade curricula, including Elder knowledge of climate disruption and Ojibwe ways of knowing. This study sought to address the following primary research question:

• What are Ojibwe Elders’ and fourth-grade educators’ perceptions of how a more accurate and thorough representation of Ojibwe knowledge about climate change could enrich fourth-grade science and social studies?

And, the following secondary questions:

• How are Ojibwe people impacted by climate disruption?

• How do Ojibwe Elders define climate and how do they notice climate is changing and disrupted?

• How do Ojibwe Elders relate to and talk about climate in terms of their overall ecology, culture, and knowledge traditions?

• What are educator’s understanding and teaching of Ojibwe culture, ecology, and knowledge?

• What evidence of Ojibwe ecology, culture, and knowledge about climate and climate change is found within science and social studies texts?

Key Findings

I gathered information from fifteen participants during semi-structured interviews, 30 to 90 minutes long. Interviews included five Elders each of the Bad River and Red Cliff Bands
of Lake Superior Chippewa, WES educators from three different schools, and two UW-Extension educators whom work with Indigenous and non-indigenous people. Interviews with Elders were designed to capture narratives and experiences related to climate disruption, climates impact on their culture, and obtain recommendations for enriching fourth-grade curricula. Interviews with WES educators were designed to capture narratives and experiences teaching science and social studies curricula, and to determine resources and pedagogy for delivering curricula. Interviews with UW-Extension educators were to learn how they work in the tribal communities.

A set of themes, Ojibwe ways of knowing, were generated from Elder interviews by coding the transcripts and applying the theoretical framework and eighteen characteristics. Three additional sets of themes were generated from the Elder interviews using Reflective Content Analysis (RCA): climate disruption, most importance, and how to include. A set of themes was generated from Wisconsin Elementary Schools (WES) educator interviews using RCA. A common theme was also generated using all three sets of interviews. Lastly, using Qualitative Content Analysis (QCA) and Critical Discourse Analysis (CDA), analyses were conducted on common science and social studies texts used by the WES.

Discussion

Analyses support the primary purpose of the study. Elders demonstrated the eighteen characteristics or ways of knowing of the theoretical model. Three additional characteristics emerged (honesty, trust, and bravery), resulting in a total of twenty-one characteristics or ways of knowing demonstrated during the interviews. They also provided insight and knowledge of their ways and made suggestions for improving fourth-grade curricula to be more representative of their knowledge and impact of climate disruption. The theoretical model (See
Figure 1) was supported through the findings during Elder interviews. Elder interviews illustrated Indigenous cosmology and Indigenous theories and the potential of this study and its recommendations for regenerating Indigenous culture through the incorporation of Indigenous voice in WES science and social studies curricula, therefore, regenerating Ojibwe culture through Indigenous knowledge of climate disruption.

Key findings of this study are discussed by category, as follows.

**Theme Category 1**

Theme Category 1, Ojibwe ways of knowing, includes two themes and seven subthemes.

Theme 1, Grandfather’s teachings, supported the theoretical framework and eighteen characteristics designed during the literature review.

Subthemes included honesty, truth, respect, and kindness [love]. These were the most common characteristics that appeared related to climate disruption in Elder interviews. Honesty and truth emerged during coding and provided much insight into the Indigenous perspective on climate disruption and ways to include their ways into the curricula. The emergence of honesty and truth, as well as courage, led to the refined twenty-one characteristics. Theme 2, Connecting with orders, also supported theoretical framework. Subthemes, kincentrism, relationality, and restorative all tied to the orders.

**Theme Category 2**

Theme Category 2, climate disruption, includes three themes and seven subthemes. Although, the themes changing climate and impact on plants and animals were anticipated, the third theme, loss of reservation was not. It was reported that beaches and flooding were leading to the shrinking and loss of reservation land and changing the way land was used. To provide
voice to the Elders, these themes and subthemes were included in recommendations for improving curricula.

**Theme Category 3**

Theme Category 3, found what the Elders said was most important to teach fourth-graders. The themes were entangled with the twenty-one characteristics such as holistic, relationality, and kincentrism. Theme 1, everything’s connected, stems from the way the participants expressed their concern for the earth and maintaining balance on the planet. What the Elders said was most important for fourth-graders learning about this topic was connection to the earth. Theme 2, experience nature and the old ways, illustrates their connection to nature and the outdoors. They reported belief that one must experience nature and appreciate and understand the importance of nature and impact of climate disruption.

**Theme Category 4**

Theme Category 4, how to include, found Elders’ suggestions to improve fourth-grade curricula. These themes were also tied to the twenty-one characteristics, as did theme Category 3. These themes reinforce the importance of the study and illustrate the value of these Knowledge Keepers as follows:

- For Theme 1, holism, they suggested educating students holistically and including multidisciplinary instruction in the curriculum design.
- For Theme 2, inquiry, they suggested hands-on inquiry and interactive learning that promotes student discovery of the impacts of climate change for themselves.
- For Theme 3, experiential learning, they suggested getting kids outdoors and experiencing nature.
• For Theme 4, starting early, they suggested starting at fourth grade, or even earlier. They said that the fourth-graders were ready to engage in the topic of climate disruption.

**Theme Category 5**

Theme Category 5, educator interviews, included four categories and five subthemes. These interviews illustrated the variety of skills and knowledge the teachers have and provided insight into time allocation and teaching restrictions. Theme 1, more experience desired, was broken into two subthemes, Ojibwe culture and climate disruption. The teachers indicated that they had minimal experience, training, or knowledge of climate disruption. They also reported having some knowledge of Native Americans, but very little background related to Ojibwe culture. Their main experiences came from participation in student field trips to the local historical museum. Theme 2, climate disruption is real, provided support of this study. Without belief in climate disruption, teachers would unlikely integrate the topic into the curricula. Each teacher cited examples of their observations of climate disruption locally and the need to include this in the curriculum. Theme 3, barriers, found many barriers, the largest of which was time and training. Teachers reported their science and social studies texts did not support the inclusion of climate disruption. Text analyses confirm the potential for including Ojibwe culture (OC), climate change (CC), or Ojibwe knowledge of climate change (KCC). Theme 4, opportunities for enrichment, included three subthemes. The first, start somewhere, each teacher had already made some progress in teaching both Ojibwe culture and climate disruption. Second, welcoming opportunities, each welcomed the opportunity to include climate disruption, Ojibwe culture and voice of the Elders. Third, willingness, each teacher
expressed willingness to learn how to better use the texts and include methods that tie science, social studies, and the topics of this study.

**Theme Category 6**

Theme Category 6, common theme, all participants indicating they are interested in working with the others for the primary purpose of the study. Elders are willing to work with educators. WES teachers are willing to adapt and work with UW-Extension educators and Elders. And, UW-Extension educators are willing to share resources and help connect the Indigenous and non-Indigenous people.

The last part of this study involved QCA and CDA of common science text and social-studies texts. Analyses found commonalities with curriculum models of Apple (2001) and Cajete (1997a).

**Recommendations for Practice**

To meet the primary goal of this study, I make the following four recommendations for my own and others’ educational practices: First, I and educators should use two common curricular models and twenty-one characteristics for assessing incorporation of Indigenous ways in WES curricula. With minimal practice, these models and coding using the twenty-one characteristics can be used to evaluate curriculum resources. Simple changes can be done to make it more culturally appropriate and connected to Indigenous ways and Indigenous cosmologies (e.g. plant beings vs. plants). This framework could similarly be applied to any textbook and standards.

Second, I recommend my own and educators’ use of this study as a contribution to the body of knowledge about Ojibwe people, specifically Elders of the Bad River and Red Cliff Bands of Lake Superior Chippewa. It provides information about how their way of life and
culture is being impacted by climate disruption. Third, I recommend my own and educators’ uses of the Science Framework for Including Ojibwe Knowledge & Climate Disruption (See Appendix G) as a model for transforming and enriching existing curricula and methods of student engagement. The framework includes ways to transform the HMH Dimensions topics, connections to ELA, mathematics, and alternative classes (art, physical education, and music), and associated science power standards incorporated into each activity. Many of the suggested activities include components which of multimedia and pluri-sensory. Each activity also includes the potential for including CC, OC, or KCC. Activities in the framework include recommendations learned from Elders during the interviews, as well as incorporate Indigenous ways. Learning about the Elders, the Indigenous communities, and the seeing and hearing first-hand about the impact climate disruption has had on their way of life has changed me forever. The process and my transformation was just as much a part of this research as the collected data. A similar, but smaller scale experience, could be designed for educators to transform the way they connect with the local Indigenous communities and places.

I recommend that educators should include suggestions by tribal Elders. This recommendation would provide voice to the tribes and the Elders, and connect students to their places in Wisconsin, to help fulfill some of the goals of Act 31. Training for staff and teachers should be developed that focuses on diversity and inclusion of Indigenous ways of knowing, not just climate disruption. This training would include Indigenous people, especially Elders as recommended by the Elders of the study. Elders should be invited to come into our classrooms to share their knowledge and reduce superficial multiculturalism. Teacher educators should review the texts and methods of delivery to avoid what Apple (2017) called corporate and political power. I recommend guidance for enriching current lessons of science
and propose a Science Framework for Including Ojibwe Knowledge & Climate Disruption. As and when the combined climate and coronaviruses disruptions would allow, I am recommending a facilitated dialogue among Indigenous people and educators.

In these recommendations I offer provide guidance from my own experience that began at the outset of this study. As a science teacher, I have expertise in earth sciences, curriculum, instruction, along with new knowledge I now have of and from Ojibwe people. Each WES educator already was teaching lessons that may not have been connected to climate disruption. I recommend that with guidance, the WES teachers could take lessons they already teach and align them with the theoretical framework and curriculum models. This recommendation is based on the subtheme, start somewhere.

For example, participating teacher Flute player’s lesson on animal waste and digestors, with some modifications or supplementing, could be tailored to focus on the use of animal waste, biofuel, to reduce our dependence on fossil fuels and mitigate the effects of climate disruption. The lesson could include a research activity on the Enbridge Line 5 oil pipeline that crosses through the Bad River Reservation. WES educators could be provided links to online interviews with Bad River tribal members on this topic. The fight over tribal sovereignty and climate disruption are intimately connected to one another. This is a current topic that came up in several interviews.

Another example is Kalnet’s lesson on physical and topographical maps already includes weather and Radar maps. She did state she talks “about how the landscape of the United States does impact the weather and how weather patterns shift and move across the United States.” This could be supplemented to include a connection to Ojibwe culture and climate change. For example, students could look at changes in landscape over time using maps
linking the weather maps of the 2016 and 2018 storms with photographs and interviews with tribal members.

**Recommendations for Further Research**

After my first interaction with Ojibwe people in the Fall of 2018, this study was designed to include the tribal people of the Bad River and Red Cliff Bands of Lake Superior Chippewa and incorporating the knowledge of the Elders within the Bad River Watershed to inform the fourth-grade curriculum in the WES. The idea of including more tribes appeared during the interviews and further research to include the knowledge of all eleven Wisconsin tribes would strengthen the research that is lacking. Additionally, including all grades K-12, would strengthen the inclusion of indigenous ways of knowing and bring awareness of climate disruption to our young people. It would also strengthen the influence of Act 31. A study to monitor the perceived impacts of climate disruption by Elders, teachers, and students could also prove to be beneficial. A final area of further research would be to study the impact of implementation of curriculum that includes Indigenous voice has on fourth-graders knowledge of climate disruption and Ojibwe knowledge.

Ideally, the final step to this research would have been a focus group allowing for open dialogue about Ojibwe culture, climate disruption, and science and social studies curricula among participants. However, due to COVID-19, it was not possible in the scope of this study. But, the participants indicated that they are interested in opening the dialogue. Several Elders have offered to connect with WES educators either in person or virtually. Some Elders have open-offers for WES educators to visit the Reservations to talk about climate disruption and impact on Ojibwe culture. UW-Extension Educators are also willing to help connect both Indigenous and non-Indigenous people. Currently, both Tribal Councils are recommended that
OJIBWE CULTURE & CLIMATE CHANGE IN CURRICULA

no one visits from outside the Reservations. However, diversity and racial inequalities are at the forefront of social media, news, and education right now! We have an opportunity to have an open dialogue about culture and diversity, with a common goal of mitigating climate disruption, a wicked problem that knows no cultural barriers. For this reason, I recommend we open dialogue now, if not in person, then virtually, if culturally appropriate.

Conclusion

The primary purpose of this study was to provide recommendations for educators to update their social-studies and science curricula by including more accurate and thorough representation of Ojibwe knowledge about climate change in fourth-grade science and social-studies curricula. I also learned how Ojibwe people were impacted by climate disruption, how Ojibwe Elders related to and talked about climate. My aim was to enrich curricula by including better information about Ojibwe culture, ecology, and knowledge. During this study, I observed and participated in a Climate Strong! Professional Development Institute that featured presentations by selected Ojibwe Elders. Ten interviews were conducted with Ojibwe Elders of both the Red Cliff and Bad River Bands of Lake Superior Chippewa. Interviews were also conducted with three fourth-grade teachers from three schools and two extension educators who worked in tribal communities. Analyses of content and discourse were conducted on fourth-grade science and social-studies curricula, specifically on topics of climate disruption and Ojibwe culture. I recommend that educators include more accurate and thorough representations of Ojibwe knowledge about climate change in curricula and instruction. The significance of this study includes strategies to educate about the impacts of climate change and potential solutions. By filling the gaps between WES curricula and Ojibwe
knowledge of climate change and disruption, and the impacts of Ojibwe culture we can provide a voice to Indigenous people in Wisconsin and update social-studies and science curricula.
References


OJIBWE CULTURE & CLIMATE CHANGE IN CURRICULA


Chilisa, B. (2012). Indigenous research methodologies. SAGE.


Educational Research Institute of America (ERIA). (June 2017). *HMH Science Dimensions Grade 5 an efficacy study.*


Hanson, A. Red Cliff Band of Lake Superior Chippewa. Personal communication. April 25, 2019.


IPCC. (2018). *Global warming of 1.5°C. An IPCC Special report on the impacts of global warming of 1.5°C above pre-industrial levels.* V. Masson-Delmotte et al. (Eds.).


IPCC. (2019). *Climate change and land: An IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems.* (P.R. Skula et al, Eds.).

https://bit.ly/2V1aCHz


classrooms form the perspectives of teachers in Woodlands Cree community contexts.

(Unpublished doctoral dissertation) [University of Regina].

Minnesota Department of Natural Resources (MDNR). (2008). *Natural wild rice in Minnesota*. Author.

Moody, H. A. (2013). ‘Before we teach it, we have to learn it’: Wisconsin Act 31 compliance within public teacher preparation programs. (File no. No. 3600949) [Doctoral dissertation]. ProQuest.


https://bit.ly/3hQX0I1

https://bit.ly/3f8ZI1C


https://bit.ly/3eXkIvN


Wisconsin Department of Public Instruction. (2019b). *Tribal nations of Wisconsin.* [https://dpi.wi.gov/amind/tribalnationswi](https://dpi.wi.gov/amind/tribalnationswi)


## Appendix A. Invitations & Consents

*Table A1. Recruitment of Participants*

<table>
<thead>
<tr>
<th>Part</th>
<th>Method</th>
<th>Participants</th>
<th>Recruiter</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Participant-</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td></td>
<td>Observation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exploratory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2A</td>
<td>Interviews</td>
<td>Red Cliff</td>
<td>This researcher &amp; Red Cliff Elderly</td>
<td>Flyer given at presentation with approval of EPD. Flyers hung by researcher under direction of EPD.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elders</td>
<td>Program Director (EPD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flyers sent to homebound Elders.</td>
<td></td>
</tr>
<tr>
<td>2B</td>
<td>Interviews</td>
<td>Bad River</td>
<td>This researcher &amp; Bad River Elderly</td>
<td>Flyer given at presentation with approval of EC. Flyers hung by researcher under direction of EC.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elders</td>
<td>Coordinator (EC)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Interviews</td>
<td>UW-Extension</td>
<td>This researcher</td>
<td>Email by this researcher using names of known educators that were approved by Deans office.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Educators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Interviews</td>
<td>WES Educators</td>
<td>This researcher</td>
<td>District emailed potential teachers (that teach fourth grade science or social studies) alerting them of a forthcoming email or call from this researcher. Researcher provided opportunity for an in person or phone presentation &amp; Q &amp; A.</td>
</tr>
<tr>
<td>5</td>
<td>QCA/CDA</td>
<td>QCA/CDA</td>
<td>n.a.</td>
<td>n.a.</td>
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</table>
### Table A2. Informed-consent Procedures

<table>
<thead>
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</thead>
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<td>1A</td>
<td>Participant-Observation,</td>
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<td>n.a.</td>
</tr>
<tr>
<td></td>
<td>Discussions,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exploratory Activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1B</td>
<td>Presentations</td>
<td>Red Cliff &amp; Bad River Elder</td>
<td>In person presentation, provided flyer &amp; IC.</td>
</tr>
<tr>
<td>2A</td>
<td>Interviews</td>
<td>Red Cliff Elders</td>
<td>In person presentation, provided flyer &amp; IC. Tobacco offered.</td>
</tr>
<tr>
<td>2B</td>
<td>Interviews</td>
<td>Bad River Elders</td>
<td>Same as 2A</td>
</tr>
<tr>
<td>3</td>
<td>Interviews</td>
<td>UW-Extension Educators</td>
<td>Phone &amp; email, provided flyer &amp; IC</td>
</tr>
<tr>
<td>4</td>
<td>Interviews</td>
<td>WES Teachers</td>
<td>Email, provided flyer &amp; IC. In person presentation.</td>
</tr>
<tr>
<td>5</td>
<td>QCA/CDA</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
</tbody>
</table>


Bad River Elder to be Interviewed: Informational/Recruitment Script

Blue indicates notes, not part of the script.

1. Boozhoo (hello in Anishinaabe)

2. I would like to take this opportunity to share with you who I am and a study we are conducting. When I am done, I will also give you a chance to ask questions (this is also a cultural norm)

3. I am a doctoral student at the University of Wisconsin-Stevens Point.

4. I am currently working on a doctoral degree in Educational Sustainability. My research focus is “Ojibwe Culture & Climate Change Informing fourth-grade Curricula in Wisconsin Public Elementary Schools (WES).

5. This research is being conducted by myself, Michael Aprill and Professor Pramod Parajuli. He is also my committee chairman and supervises my research.

6. We are looking for Elders of the Bad River Band of the Lake Superior Chippewa that are interested in climate change, Ojibwe culture, or how climate disruption impacts Ojibwe culture.

7. Our research study will focus on Ojibwe culture and how this information could inform fourth-grade curricula in Wisconsin Public Elementary Schools.

8. The purpose of our study is to provide recommendations for educators for updating their curricula in social-studies and science. This includes a more accurate and thorough representation of Ojibwe knowledge, particularly climate change. If you are interested in climate change, we would like to give you a voice.

9. This topic is very heartfelt and comes with great respect and humility for Ojibwe culture and the importance of incorporating your voice into our curricula.
10. We come to you as an ambassador between two systems and cultures and hope to bring enrichment to the fourth-grade science and social-studies curricula. And, hope that we will have something to give back to your tribal community as well.

11. As part of our study, we would like to express an invitation to be a part of the study.

12. This would involve me a 45 to 90-minute interview at a place of your choosing. Questions would involve climate change, Indigenous Knowledge, impacts of climate change on Ojibwe culture, and how your knowledge could inform fourth-grade social-studies and science curricula in Wisconsin.

13. During that time, depending on your preference I would either videotape, audiotape, or take notes.

14. Prior to any information being published, we would provide you with a copy of transcripts and data to review and many any recommendations or changes.

15. You can withdraw from the study at any time.

16. We may also ask you to participate in a focus group towards the end of the study. During the focus group this researchers would facilitate a discussion between educators and Elders about the topic.

17. You do not need to tell me now if you would be willing to participate. You can call Sandy Corbine, Elderly Coordinator for the Bad River Band of Lake Superior Chippewa Indians at her office (715-682-7150 ext. 1495) or cell: (715-682-4714)

18. Do you have any questions?

19. Miigwetch (thank you in Anashinaabe)
Bad River Elder to be Interviewed: Informational / Recruitment Flyer

SEEKING VOLUNTEERS FOR A RESEARCH STUDY:
Ojibwe Culture & Climate Change Informing fourth-grade Curricula in Wisconsin Public Elementary Schools

Our research team is currently recruiting Elders from the Bad River Bands of the Lake Superior Chippewa. We are looking for those interested in climate change, Ojibwe culture, or how climate disruption impacts Ojibwe culture.

This study focuses on Ojibwe culture and climate change and on how this information may enrich fourth-grade curricula in Wisconsin Public Elementary Schools by making recommendations for educators to assist in updating science & social-studies curricula that is more accurate and representative of Ojibwe knowledge, especially about climate change.

We come to you as an ambassador between two systems and cultures. We want to give you a voice.

Your role would involve a 45 to 90-minute interview at a place of your choosing. Questions would involve climate change, Indigenous Knowledge, impacts of climate change on Ojibwe culture, and how your knowledge could inform fourth-grade social-studies and science curricula. Data would be collected through video, audio, or notes (the method would be up to you). You may also be asked, if willing, to participate in a focus group. You may withdraw at any time.

The research is conducted by Michael Aprill, doctoral student and primary investigator, Professor Pramod Parajuli

If interested and willing to be a participant in an interview and possibly a focus group, please contact Sandy Corbine, Elderly Coordinator for the Bad River Band of Lake Superior Chippewa Indians at her office (715) 682-7150 Ext. 1495 or Cell (715) 682-4714.
Miigwech
Red Cliff Elder to be Interviewed: Informational/Recruitment Script

Blue indicates notes, not part of the script.

1. Boozhoo (hello in Anishinaabe)

2. I would like to take this opportunity to share with you who I am and a study we are conducting. When I am done, I will also give you a chance to ask questions (this is also a cultural norm)

3. I am a doctoral student at the University of Wisconsin-Stevens Point.

4. I am currently working on a doctoral degree in Educational Sustainability. My research focus is “Ojibwe Culture & Climate Change Informing fourth-grade Curricula in Wisconsin Public Elementary Schools (WES).

5. This research is being conducted by myself, Michael Aprill and Professor Pramod Parajuli. He is also my committee chairman and supervises my research.

6. We are looking for Elders of the Red Cliff Band of the Lake Superior Chippewa that are interested in climate change, Ojibwe culture, or how climate disruption impacts Ojibwe culture.

7. Our research study will focus on Ojibwe culture and how this information could inform fourth-grade curricula in Wisconsin Public Elementary Schools.

8. The purpose of our study is to provide recommendations for educators for updating their curricula in social-studies and science. This includes a more accurate and thorough representation of Ojibwe knowledge, particularly climate change. If you are interested in climate change, we would like to give you a voice.

9. This topic is very heartfelt and comes with great respect and humility for Ojibwe culture and the importance of incorporating your voice into our curricula.
10. We come to you as an ambassador between two systems and cultures and hope to bring enrichment to the fourth-grade science and social-studies curricula. And, hope that we will have something to give back to your tribal community as well.

11. As part of our study, we would like to express an invitation to be a part of the study.

12. This would involve me a 45 to 90-minute interview at a place of your choosing. Questions would involve climate change, Indigenous Knowledge, impacts of climate change on Ojibwe culture, and how your knowledge could inform fourth-grade social-studies and science curricula in Wisconsin.

13. During that time, depending on your preference I would either videotape, audiotape, or take notes.

14. Prior to any information being published, we would provide you with a copy of transcripts and data to review and many any recommendations or changes.

15. You can withdraw from the study at any time.

16. We may also ask you to participate in a focus group towards the end of the study. During the focus group this researchers would facilitate a discussion between educators and Elders about the topic.

17. You do not need to tell me now if you would be willing to participate. You can call Anna Hanson, Director of Elderly Program for the Red Cliff of Lake Superior Chippewa Indians at her office (715-779-3706) or Researcher, Michael Aprill (as requested by Mrs. Hanson) at (920-226-9305)

18. Do you have any questions?

19. Miigwetch (thank you in Anashinaabe)
OJIBWE CULTURE & CLIMATE CHANGE IN CURRICULA

Red Cliff Elder to be Interviewed: Informational / Recruitment Flyer

SEEKING VOLUNTEERS FOR A RESEARCH STUDY:
Ojibwe Culture & Climate Change Informing fourth-grade Curricula
at Wisconsin Public Elementary Schools

Our research team is currently recruiting Elders from the Red Cliff Bands of the Lake Superior Chippewa. We are looking for those interested in climate change, Ojibwe culture, or how climate disruption impacts Ojibwe culture.

This study focuses on Ojibwe culture and climate change and on how this information may enrich fourth-grade curricula in Wisconsin Public Elementary Schools by making recommendations for educators to assist in updating science & social-studies curricula that is more accurate and representative of Ojibwe knowledge, especially about climate change.

We come to you as an ambassador between two systems and cultures. We want to give you a voice.

Your role would involve a 45 to 90-minute interview at a place of your choosing. Questions would involve climate change, Indigenous Knowledge, impacts of climate change on Ojibwe culture, and how your knowledge could inform fourth-grade social-studies and science curricula. Data would be collected through video, audio, or notes (the method would be up to you). You may also be asked, if willing, to participate in a focus group. You may withdraw at any time. The research is conducted by Michael Aprill, doctoral student and primary investigator, Professor Pramod Parajuli.

If interested and willing to be a participant in an interview and possibly a focus group, please contact Anna Hanson, Director of Elderly Program for the Red Cliff Band of Lake Superior Chippewa Indians at her office (715) 779-3706 or Researcher, Michael Aprill at (920) 226-9305.
Miigwech
UW-Extension Educator to be Interviewed: Informational/Recruitment Script

Blue indicates notes, not part of the script.

1. Hello, Boozhoo: I would like to take this opportunity to share with you who I am and a study we are conducting. When I am done, I will also give you a chance to ask questions.

2. I am a doctoral student at the University of Wisconsin-Stevens Point.

3. I am currently working on a doctoral degree in Educational Sustainability. My research focus is “Ojibwe Culture & Climate Change Informing fourth-grade Curricula in Wisconsin Public Elementary Schools (WES).

4. This research is being conducted by myself, Michael Aprill and Professor Pramod Parajuli. He is also my committee chairman and supervises my research.

5. We are looking for UW-Extension educators that work with the Bad River and Red Cliff Tribal Communities that are interested in climate change, Ojibwe culture, or how climate disruption impacts Ojibwe culture.

6. Our research study will focus on Ojibwe culture and how this information could inform fourth-grade curricula in Wisconsin Public Elementary Schools.

7. The purpose of our study is to provide recommendations for educators for updating their curricula in social-studies and science. This includes a more accurate and thorough representation of Ojibwe knowledge, particularly climate change.

8. This topic is very heartfelt and comes with great respect and humility for Ojibwe culture and the importance of incorporating their voice and the perspective of those that work closely with the Indigenous people to include them more in the science and social-studies curricula.
9. We come to you as an ambassador between two systems and cultures and hope to bring enrichment to the fourth-grade science and social-studies curricula. And, hope that we will have something to give back to your tribal community as well.

10. As part of our study, we would like to express an invitation to be a part of the study.

11. This would involve me a **45 to 90-minute interview** at a place of your choosing. Questions would involve climate change, Indigenous Knowledge, impacts of climate change on Ojibwe culture, and the knowledge you have of both cultures and systems could inform fourth-grade social-studies and science curricula in Wisconsin.

12. During that time, depending on your preference I would either videotape, audiotape, or take notes.

13. Prior to any information being published, we would provide you with a copy of transcripts and data to review and many any recommendations or changes.

14. You can withdraw from the study at any time.

15. We may also ask you to participate in a focus group towards the end of the study. During the focus group this researchers would facilitate a discussion between educators and Elders about the topic.

16. You do not need to tell me now if you would be willing to participate. You can call contact Researcher, Michael Aprill at (920) 226-9305 or email: mapri507@uwsp.edu

17. Do you have any questions?

18. Thank you, Miigwech
UW-Extension Educator to be Interviewed: Informational / Recruitment Script

SEEKING VOLUNTEERS FOR A RESEARCH STUDY:
Ojibwe Culture & Climate Change Informing fourth-grade Curricula
at Wisconsin Public Elementary Schools

Our research team is currently recruiting UW Extension Educators that work with the Red Cliff and Bad River Tribal Communities. We are looking for those interested in climate change, Ojibwe culture, or how climate disruption impacts Ojibwe culture.

This study focuses on Ojibwe culture and climate change and on how this information may enrich fourth-grade curricula in Wisconsin Public Elementary Schools by making recommendations for educators to assist in updating science & social-studies curricula that is more accurate and representative of Ojibwe knowledge, especially about climate change.

We come to you as an ambassador between two systems and cultures and hope to bring enrichment to fourth-grade science and social-studies curricula and give something back to the tribal community.

Your role would involve a 45 to 90-minute interview at a place of your choosing. Questions would involve climate change, Indigenous Knowledge, impacts of climate change on Ojibwe culture, and the knowledge you have of both cultures and systems could inform fourth-grade social-studies and science curricula in Wisconsin. Data would be collected through video, audio, or notes (the method would be up to you). You may also be asked, if willing, to participate in a focus group. You may withdraw at any time. The research is conducted by Michael Aprill, doctoral student and primary investigator, Professor Pramod Parajuli

If interested and willing to be a participant in an interview and possibly a focus group, please contact Researcher, Michael Aprill at (920) 226-9305 or email: mapri507@uwsp.edu

Miigwech
1. Hello, Boozhoo (Hello in Anashinaabe): I would like to take this opportunity to share with you who I am and a study we are conducting. When I am done, I will also give you a chance to ask questions.

2. I am a doctoral student at the University of Wisconsin-Stevens Point and a science teacher at South High School.

3. I am currently working on a doctoral degree in Educational Sustainability. My research focus is “Ojibwe Culture & Climate Change Informing Fourth-Grade Curricula in Wisconsin Public Elementary Schools (WES).

4. This research is being conducted by myself, Michael Aprill and Professor Pramod Parajuli. He is also my committee chairman and supervises my research.

5. We are looking for teachers who teach both science and social-studies subjects in fourth grades, and would have an interest in helping enrich the curricula related to climate change, Ojibwe culture, or how climate disruption impacts Ojibwe culture.

6. Our research study will focus on Ojibwe culture and how this information could inform fourth-grade curricula in Wisconsin Public Elementary Schools.

7. The purpose of our study is to provide recommendations for educators for updating their curricula in social-studies and science. This includes a more accurate and thorough representation of Ojibwe knowledge, particularly climate change. We would like to give Ojibwe people in Wisconsin a voice.

8. This topic is very heartfelt and comes with great respect and humility for Ojibwe culture and the importance of incorporating their voice and the perspective of those that work closely...
with the Indigenous people to include them more in the science and social-studies curricula. This study is not meant in any way to judge or criticize curricula, but rather analyze it and look for ways to possibly enrich it.

9. We come to you as an ambassador between two systems and cultures and hope to bring enrichment to the fourth-grade science and social-studies curricula. And, hope that we will have something to give back to your tribal community as well as our school district.

10. As part of our study, we would like to express an invitation to be a part of the study.

11. This would involve me a 45 to 90-minute interview at a place of your choosing. Questions would involve climate change, Indigenous Knowledge, impacts of climate change on Ojibwe culture, and most importantly questions of what curricula may be in use or available related to those topics. Follow up questions to clarify which sources and / or curricula are in use may also be needed 30 to 60 minutes. In addition, the research team will be conducting an analysis of the curricula.

12. During that time, depending on your preference I would either videotape, audiotape, or take notes.

13. Prior to any information being published, we would provide you with a copy of transcripts and data to review and many any recommendations or changes.

14. You can withdraw from the study at any time.

15. We may also ask you to participate in a focus group towards the end of the study. During the focus group this researchers would facilitate a discussion between educators and Elders about the topic.

16. You do not need to tell me now if you would be willing to participate. You can call contact Researcher, Michael Aprill at (920) 226-9305 or email: mapri507@uwsp.edu
17. Do you have any questions?

18. Miigwech (Thank you in Anashinaabe)
WES Informational Recruitment Script (Researcher by phone, email, or in person)

SEEKING VOLUNTEERS FOR A RESEARCH STUDY:

Ojibwe Culture & Climate Change Informing fourth-grade Curricula

in Wisconsin Public Elementary Schools

Our research team is currently recruiting Elders from the Red Cliff Bands of the Lake Superior Chippewa. We are looking for those interested in climate change, Ojibwe culture, or how climate disruption impacts Ojibwe culture.

This study focuses on Ojibwe culture and climate change and on how this information may enrich fourth-grade curricula in Wisconsin Public Elementary Schools by making recommendations for educators to assist in updating science & social-studies curricula that is more accurate and representative of Ojibwe knowledge, especially about climate change.

We come to you as an ambassador between two systems and cultures and hope to bring enrichment to fourth-grade science and social-studies curricula and give something back to the tribal community.

Your role would involve a 45 to 90-minute interview at a place of your choosing. Questions would involve climate change, Indigenous Knowledge, impacts of climate change on Ojibwe culture, and most importantly questions of what curricula may be in use or available related to these topics. Follow up questions to clarify which sources and / or curricula are in use maybe also needed 30 to 60 minutes. Data would be collected through video, audio, or notes (the method would be up to you). In addition, the research team will be conducting an analysis of the curricula. You may also be asked, if willing, to participate in a focus group. You may withdraw at any time.

The research is conducted by Michael Aprill, doctoral student and primary investigator, Professor Pramod Parajuli If interested and willing to be a participant in an interview and possibly a focus group, please contact Michael Aprill at (920) 226-9305 or email: mapri507@uwsp.edu

Miigwech (Thank You)
Informed Consent to Participate in Human Subjects Research

Interviews with Red Cliff or Bad River Elders

Michael Aprill, doctoral student, educational sustainability and Adjunct Professor Pramod Parajuli, Ph.D. at the University of Wisconsin-Stevens Point would appreciate your participation in a research study designed to provide recommendations for educators to update their social-studies and science curricula by including more accurate and thorough representations of Ojibwe knowledge, particularly about climate change.

Primary purpose of research: to provide recommendations for educators to update their social-studies and science curricula by including more accurate and thorough representations of Ojibwe knowledge, particularly about climate change.

Five secondary purposes are as follows:

• To learn how Ojibwe people are impacted by climate disruption;

• To explore how Ojibwe Elders define climate and how they notice climate is changing and is disrupted;

• To explore how Ojibwe Elders relate to and talk about climate in terms of their overall ecology, culture, and knowledge traditions;

• To assess educators understanding and teaching of Ojibwe culture, ecology, and knowledge;

• To analyze science and social-studies texts for evidence of Ojibwe ecology, culture, and knowledge about climate and climate change; and

Details of Participation in this study:

• Participant will be interviewed about Indigenous Knowledge, the impact of climate on Ojibwe culture and ways to incorporate this knowledge into science and social-studies curriculum.

• The doctoral student will interview the participant 1 time for a period of 45 to 90 minutes. However, you will be allowed additional time if needed.
• Location will be determined by the participant. This may be within the Bad River or Red Cliff Tribal Community or other location of your choice. Participant may ask this researchers for suggestions if needed.

• This researcher will videotape, audiotape, or take notes during the presentation. The participant can select which of these forms they would prefer or allow.

• Data will be collected by this researcher during the interview.

• This researcher will provide copies of transcripts prior to any publications to allow you to review the transcripts, make any revisions, or remove any data.

• You may be asked to participate in a focus group for secondary analysis of data.

• Results determined to benefit the study and you as a participant will be provided. If additional research is sought, you will be invited to participate again.

• Participants may opt in or out of follow up interviews or focus group.

**Voluntary Participation:** Your participation in this study is completely voluntary. You may discontinue participation or may refuse continuing participation without penalty. All identifiable information will be removed from the study and destroyed or deleted.

**Withdrawing from Participation:** You may withdraw from the study at any time, with no consequences. Your information may be removed from the study at the request of you or the investigator.

**Alternatives:** you may choose not to participate. You may choose to participate in the study by answering the questions in writing instead of an interview.

**Number of participants:** Anticipated number of participants is 13 to 16. Bad River Elders Interviewed: 5, Red Cliff Elders Interviewed: 5

**Benefits:** There may be no immediate benefit to you as a result of your participation in this study, it is hoped that we may gain valuable information about Ojibwe knowledge, climate knowledge, and impacts on culture that may be integrated into fourth-grade science and social-studies curriculum. Indirect benefits may include the ability to know you were able to express your opinion about the topic, your experiences working with Indigenous and non-indigenous people and your voice was heard. Fourth-grade teachers may benefit through enrichment of their curriculum. UW-Extension educators may benefit by bringing voices from different stake holders together. You may also benefit through sharing information and learning more about
other stake holder viewpoints. The doctoral student will benefit in completion of their doctoral degree.

**Risks:** There is no foreseeable risks to you as a participant other than the inconvenience of the time to complete your presentation and possible emotional discomfort as discussing the “hot topic” of climate change and impacts on culture and society.

**Confidentiality:** The information that you present will not identify you by name unless you specifically request that your name be used. Alternatively, a pseudonym of your choosing may be used or this researchers may assign a pseudonym for any presentations or publications.

**Data Storage:** Data will be stored on an encrypted flash drive or a protected device that is password protected and maintained for at least seven years stored in a locked file cabinet and not available to anyone not directly involved in this study.

**Other Information:** Data collected from this study will not be used for additional research. In the event of a computer glitch, the investigator may withdraw the participant results from the gathered data.

**Contacting Researchers:** Once the study is completed, you may receive the results of the study. If you would like these results, or if you have any questions in the meantime, please contact:

Michael Aprill, Doctoral Student/Researcher; School of Education; University of Wisconsin—Stevens Point; Stevens Point, WI 54481; (920) 226-9305, mapri507@uwsp.edu

Pramod Parajuli, Ph.D. (Primary Investigator); (503) 969-7391, pparajul@uwsp.edu

**Complaints:** If you have any complaints about your treatment as a participant in this study or believe that you have been harmed in some way by your participation, please call or write:

Anna Haines, PhD; Professor, Natural Resource Planning Director, Center for Land Use Education 800 Reserve Street, College of Natural Resources
University of Wisconsin, Stevens Point and Extension; Stevens Point, WI 54481
(715) 346-2386, irbchair@uwsp.edu
“I have read and understand the information provided to me; that my participation is voluntary and I may withdraw at any time.”

Printed Name: ___________________________
Signature: ______________________________
Date Signed: ___________________________

Signature if interested in being part of the focus group: _________________________________
Date Signed: ______________
Informed Consent to Participate in Human Subjects Research

Interviews with UW-Extension Educators

Michael Aprill, doctoral student/researcher, educational sustainability and Adjunct Professor Pramod Parajuli, Ph.D. at the University of Wisconsin-Stevens Point would appreciate your participation in a research study designed to provide recommendations for educators to update their social-studies and science curricula by including more accurate and thorough representations of Ojibwe knowledge, particularly about climate change.

**Primary purpose of research:** to provide recommendations for educators to update their social-studies and science curricula by including more accurate and thorough representations of Ojibwe knowledge, particularly about climate change.

**Six secondary purposes are as follows:**

- To learn how Ojibwe people are impacted by climate disruption;
- To explore how Ojibwe Elders define climate and how they notice climate is changing and is disrupted;
- To explore how Ojibwe Elders relate to and talk about climate in terms of their overall ecology, culture, and knowledge traditions;
- To analyze science and social-studies texts for evidence of Ojibwe ecology, culture, and knowledge about climate and climate change;
- To assess educators’ understanding and teaching of Ojibwe culture, ecology, and knowledge; and
- To facilitate open dialogue among educators and Ojibwe Elders on these topics.

**Details of Participation in this study:**

- Participant will be interviewed about Indigenous Knowledge, the impact of climate on Ojibwe culture and ways to incorporate this knowledge into science and social-studies curriculum. Interviews will also focus on the participants’ role and knowledge of climate change and Ojibwe culture.
- The doctoral student will interview the participant 1 time for a period of 45 to 90 minutes. However, you will be allowed additional time if needed.
• Location will be determined by the participant. This may be within the Bad River or Red Cliff Tribal Communities or other location of your choice. Participant may ask this researchers for suggestions if needed.

• This researcher will videotape, audiotape, or take notes during the presentation. The participant can select which of these forms they would prefer or allow.

• Data will be collected by this researcher during the interview.

• This researcher will provide copies of transcripts prior to any publications to allow you to review the transcripts, make any revisions, or remove any data.

• You may be asked to participate in a focus group for secondary analysis of data.

• Results determined to benefit the study and you as a participant will be provided. If additional research is sought, you will be invited to participate again.

• Participants may opt in or out of follow up interviews or focus group.

Voluntary Participation: Your participation in this study is completely voluntary. You may discontinue participation or may refuse continuing participation without penalty. All identifiable information will be removed from the study and destroyed or deleted.

Withdrawing from Participation: You may withdraw from the study at any time, with no consequences. Your information may be removed from the study at the request of you or the investigator.

Alternatives: you may choose not to participate. You may choose to participate in the study by answering the questions in writing instead of an interview.

Number of participants: Anticipated number of participants is 13 to 16. UW-Extension educators interviewed: 2 to 3.

Benefits: There may be no immediate benefit to you as a result of your participation in this study, it is hoped that we may gain valuable information about Ojibwe knowledge, climate knowledge, and impacts on culture that may be integrated into fourth-grade science and social-studies curriculum. Indirect benefits may include the ability to know you were able to express your opinion about the topic, your experiences working with Indigenous and non-indigenous people. and your voice was heard. Fourth-grade teachers may benefit through enrichment of their curriculum. UW-Extension educators may benefit by bringing voices from different stake holders together. You may also benefit
through sharing information and learning more about other stake holder viewpoints. The doctoral student will benefit in completion of their doctoral degree.

**Risks:** There is no foreseeable risks to you as a participant other than the inconvenience of the time to complete your presentation and possible emotional discomfort as discussing the “hot topic” of climate change and impacts on culture and society.

**Confidentiality:** The information that you present will not identify you by name unless you specifically request that your name be used. Alternatively, a pseudonym of your choosing may be used or this researchers may assign a pseudonym for any presentations or publications.

**Data Storage:** Data will be stored on an encrypted flash drive or a protected device that is password protected and maintained for at least seven years stored in a locked file cabinet and not available to anyone not directly involved in this study.

**Other Information:** Data collected from this study will not be used for additional research. In the event of a computer glitch, the investigator may withdraw the participant results from the gathered data.

**Contacting Researchers:** Once the study is completed, you may receive the results of the study. If you would like these results, or if you have any questions in the meantime, please contact:

Michael Aprill, Doctoral Student/Researcher; School of Education; University of Wisconsin—Stevens Point; Stevens Point, WI 54481; (920) 226-9305, mapri507@uwsp.edu; Pramod Parajuli, Ph.D. (Primary Investigator); (503) 969-7391, pparajul@uwsp.edu

**Complaints:** If you have any complaints about your treatment as a participant in this study or believe that you have been harmed in some way by your participation, please call or write:

Anna Haines, PhD; Professor, Natural Resource Planning Director, Center for Land Use Education 800 Reserve Street, College of Natural Resources University of Wisconsin, Stevens Point and Extension; Stevens Point, WI 54481; (715) 346-2386, irbchair@uwsp.edu

Although Dr. Haines will ask your name, all complaints are kept in confidence.

“I have read and understand the information provided to me; that my participation is voluntary and I may withdraw at any time.”
OJIBWE CULTURE & CLIMATE CHANGE IN CURRICULA

Printed Name: __________________________
Signature: ______________________________
Date Signed: ___________________________

Signature if interested in being part of the focus group: _________________________________
Date Signed: ______________
Informed Consent to Participate in Human Subjects Research

Interviews with Wisconsin Elementary Public School (WES) Teachers

Michael Aprill, doctoral student/researcher, educational sustainability and Adjunct Professor Pramod Parajuli, Ph.D. at the University of Wisconsin-Stevens Point would appreciate your participation in a research study designed to provide recommendations for educators to update their social-studies and science curricula by including more accurate and thorough representations of Ojibwe knowledge, particularly about climate change.

**Primary purpose of research:** to provide recommendations for educators to update their social-studies and science curricula by including more accurate and thorough representations of Ojibwe knowledge, particularly about climate change.

**Six secondary purposes are as follows:**

- To learn how Ojibwe people are impacted by climate disruption;
- To explore how Ojibwe Elders define climate and how they notice climate is changing and is disrupted;
- To explore how Ojibwe Elders relate to and talk about climate in terms of their overall ecology, culture, and knowledge traditions;
- To analyze science and social-studies texts for evidence of Ojibwe ecology, culture, and knowledge about climate and climate change;
- To assess educators’ understanding and teaching of Ojibwe culture, ecology, and knowledge; and
- To facilitate open dialogue among educators and Ojibwe Elders on these topics.

**Details of Participation in this study:**

- Participant will be interviewed by doctoral student. Interviews will include questions regarding the current science and social-studies curriculum that is implemented and planned to be implemented in the school. Questions will also inquiry as to the specifics of the curriculum. Interviewees will provide access to curriculum for the purposes of content and discourse analysis.
The doctoral student will interview the participant 1 time for a period of 45 to 90 minutes. A follow up interview meeting(s) may take place for clarification of the curriculum that will take a total of 30 to 60 minutes.

Location will be determined by the participant in the school district.

This researcher will videotape, audiotape, or take notes during the presentation. The participant can select which of these forms they would prefer or allow.

Data will be collected by this researcher during the interview.

This researcher will provide copies of transcripts prior to any publications to allow you to review the transcripts, make any revisions, or remove any data.

You may be asked to participate in a focus group for secondary analysis of data.

Results determined to benefit the study and you as a participant will be provided. If additional research is sought, you will be invited to participate again.

Participants may opt in or out of follow up interviews or focus group.

**Voluntary Participation:** Your participation in this study is completely voluntary. You may discontinue participation or may refuse continuing participation without penalty. All identifiable information will be removed from the study and destroyed or deleted.

**Withdrawing from Participation:** You may withdraw from the study at any time, with no consequences. Your information may be removed from the study at the request of you or the investigator.

**Alternatives:** you may choose not to participate. You may choose to participate in the study by answering the questions in writing instead of an initial interview, followed up with a meeting for clarifications.

**Number of participants:** Anticipated number of participants is 13 to 16. Number of fourth-grade educators interviewed: 3.

**Benefits:** There may be no immediate benefit to you as a result of your participation in this study, it is hoped that we may gain valuable information about Ojibwe knowledge, climate knowledge, and impacts on culture that may be integrated into fourth-grade science and social-studies curriculum. Indirect benefits may include the ability to know you were able to express your opinion about the topic, your experiences working with Indigenous and non-indigenous
people. and your voice was heard. Fourth-grade teachers may benefit through enrichment of their curriculum. UW-Extension educators may benefit by bringing voices from different stakeholders together. You may also benefit through sharing information and learning more about other stake holder viewpoints. The doctoral student will benefit in completion of their doctoral degree.

**Risks:** There is no foreseeable risks to you as a participant other than the inconvenience of the time to complete your presentation and possible emotional discomfort as discussing the “hot topic” of climate change and impacts on culture and society.

**Confidentiality:** The information that you present will not identify you by name unless you specifically request that your name be used. Alternatively, a pseudonym of your choosing may be used or this researchers may assign a pseudonym for any presentations or publications. The school location and district will not be identified in the study.

**Data Storage:** Data will be stored on an encrypted flash drive or a protected device that is password protected and maintained for at least seven years stored in a locked file cabinet and not available to anyone not directly involved in this study.

**Other Information:** Data collected from this study will not be used for additional research. In the event of a computer glitch, the investigator may withdraw the participant results from the gathered data.

**Contacting Researchers:** Once the study is completed, you may receive the results of the study. If you would like these results, or if you have any questions in the meantime, please contact:

Michael Aprill, Doctoral Student/Researcher; School of Education; University of Wisconsin—Stevens Point; Stevens Point, WI 54481; (920) 226-9305, mapri507@uwsp.edu

Pramod Parajuli, Ph.D. (Primary Investigator); (503) 969-7391, pparajul@uwsp.edu

**Complaints:** If you have any complaints about your treatment as a participant in this study or believe that you have been harmed in some way by your participation, please call or write:

Anna Haines, PhD; Professor, Natural Resource Planning Director, Center for Land Use Education 800 Reserve Street, College of Natural Resources
Although Dr. Haines will ask your name, all complaints are kept in confidence.

“I have read and understand the information provided to me; that my participation is voluntary and I may withdraw at any time.”

Printed Name: ___________________________
Signature: ______________________________
Date Signed: ___________________________

Signature if interested in being part of the focus group: ________________________________
Date Signed: ______________
Detailed Procedures for Recruitment

Below are the specific procedures used for recruitment for each part of the study. These procedures have been coordinated agencies and institutions.

Bad River Elders
1. Researcher presented during dining times. Fliers / informed-consent form were available as a handout.
2. Flyers were given out during dining times, distributed, or hung up at approved locations or people through the Aging Directors Office.
3. Flyers were sent home to home-bound Elders.
4. Flyers included contact information for the Aging Directors Office and researcher team (As requested by Aging Director to help field questions)
5. Additional recruitment was also done by having the Aging Director Reach out to potential Elders or those that have contact with Elders.

Red Cliff Elders
1. Researcher presented during dining times. Fliers and informed-consent forms were available as a handout.
2. Flyers were given out during dining times, distributed, or hung up at approved locations or people through the Aging Directors Office.
3. Flyers were sent home to home-bound Elders.
4. Flyers included contact information for the Aging Directors Office. (As requested by the Aging Director)
5. Additional recruitment was also done by having the Aging Director Reach out to potential Elders or those that have contact with Elders.

UW-Extension Educators
1. The doctoral student/researcher contacted UW Extension dean’s office to obtain permission to reach out to specific known UW Extension educators.
2. The doctoral student/researcher emailed educators using the approved script and flyer discussing research project.
Wisconsin Elementary Public Schools (WES) Educators

1. The doctoral student/researcher emailed the district’s Students & Instruction (S&I) contact requesting an email be sent to possible fourth-grade teachers. The email included all fourth-grade science and social-studies teachers at a specific school and their principle alerting them that they would be contacted from a UWSP email address. The email included a copy of the research abstract and notified staff that the choice to participate is theirs.

2. The doctoral student/researcher then emailed the teachers at the selected school with the approved script. It also included a copy of the research flyer and informed consent. The teachers were told that the doctoral student would follow up with a phone call and is available for an in person presentation.

3. Upon request, the researcher did an in-person presentation at a given school or scheduled an interview.

4. Informed-consent forms were signed and turned in to the researcher at the interview for WES1.

5. Informed-consent forms were signed and scanned back to the researcher for interviews with WES2 and WES3.

6. The above procedures (step 1—4) were completed for WES1. The above procedures (step 1, 2, and 5) were completed for WES 2 and 3.
BAD RIVER ELDERLY PROGRAM

To: Michael April, Pramod Parajuli Ph D
    and Team members
Re: Letter of Support
Date: 4-26-19
From Sandy Corbine, Elderly Coordinator

To Whom it may concern,

I am Sandy Corbine the Elderly Coordinator of the Bad River Elderly Nutrition Program and have been with the Elderly Program for over 16 years, in one position or another here.

I fully support the effort of Michael April and Professor Pramod Parajuli and other team persons as they research the impact of climate disruption on indigenous culture and analyze science and social studies curriculum.

The Elderly Program services several elders ranging roughly 100+ elders, on site and home bound meals, along with activities and a variety of other informational projects through out the year. Weather it being one on one or group settings. The perfect time and procedure to reach the elders is during the dinner hour while they congregate for the daily meal, this I have found to be most eventful.

I am super excited to help the team with this process to reach the goal, following the procedure, we discussed with flyers and a brief presentation your team would like to prepare for to the elders to recruit any parties of interest. This way they would voluntarily step up to show interest and support.

I will include and exchange information with Bad Rivers DNR Erik Andrews, who is more involved on climate disruption. I do believe this will have a positive outcome, I myself, also an elder am eager to learn more of the indigenous view and voice of our tribal people and await your arrival.

Milgwich,

Sandy Corbine, Elderly Coordinator
715-682-7150 ext:1495 cell 715-292-4714
Bad River Band of Lake Superior Tribe of Chippewa Indians
Odanah Wi
54861
April 25, 2019

Michael April and Pramod Parajuli, PhD
N4320 Kettleview Road
Plymouth, WI, 53073

Dear Mr. April and Mr. Parajuli:

Boozhoo means (Hello) Gentlemen in our native language.

The Red Cliff Elderly Program would like very much to support Mr. April on his education goals, research and the use of our Elders in his upcoming study about climate change and the effects on our tribe. In our culture Elders are revered as the wise ones who teach us all. We as a community learn from them.

As our world continues to experience climate change at a rapid pace the potential for eco and environment threats are real. This hits home for native communities across Indian country. Not only to visualize, but to live through the impact. What will become of our future generations?

It is an honor, to give Mr. April and Mr. Parajuli this opportunity for our tribe’s voice to be heard in his analyzing science and social studies curriculum.

Migwech (Thank you)

Anna Hanson, Director Elderly Program
April 26, 2019

Michael Aprill,

Your research request, Ojibwe Culture & Climate Change Informing 4th Grade Curriculum at Wisconsin Public Elementary School, has been thoroughly reviewed and meets the policies and procedures for research within the [REDACTED] District. I understand this is a team of researchers that will be working on this research. This research is innovative and has the potential to heighten the learning not only for students within our district but across the State of Wisconsin.

I personally applaud your scholarly research efforts as you continue to learn and grow as a professional. Giving back to our district and the larger community helps the profession of educators continue to develop and grow to serve students at the best level possible.

I look forward to hearing about your progress along your research journey. Feel free to reach out to me at any time as you complete your work. It is a pleasure to support your work. Please know that Professor Parajull can also contact me at anytime if needed.

Sincerely,

Director of Student and Instructional Services

Department of Student and Instructional Services
Monday April 29, 2019

Michael Aprill & Dr. Pramod Parajuli
N4320 Kettleview Road
Plymouth, WI 53073

Dear Mr. Aprill and Dr. Parajuli,

We are happy to support you in your study on how the Ojibwe people are impacted by climate disruption and how the Ojibwe elders define climate and climate change. We are looking forward to seeing your results and how they impact the curriculum and instruction of social studies and science in the [REDACTED] District.

Please let us know what we can do to support you in this process.

Sincerely,

Coordinator of Student Instructional Services

Coordinator of Student Instructional Services

Department of Student and Instructional Services
April 29, 2019

Michael Aprill and Pramod Parajuli, PhD
N4320 Kettleview Road
Plymouth WI 53073

To Whom It May Concern,

I am pleased to provide this letter of support as the Dean and Director of the University of Wisconsin-Madison, Division of Extension for Mr. Michael Aprill’s doctoral study “Ojibwe Culture & Climate Change Informing 4th Grade Curriculum at Wisconsin Public Elementary School (WPS)”. Mr. Aprill’s study will focus on the traditions of the Ojibwe people and how to integrate their knowledge about climate into science and social studies curricula in Wisconsin. This study will uniquely combine analyses of curricula on climate change with analyses of Ojibwe traditions.

I am in support of Mr. Aprill’s team working with [REDACTED] and other UW-Madison, Division of Extension educators as appropriate who are involved in tribal education and based on their willingness to participate.

As part of the study, I understand the team will be completing an applied residency project with one of the programs [REDACTED] is developing for July 8 to July 12, 2019, the "Climate Strong! Professional Development Institute." This institute is partially in partnership with UW-Madison Division of Extension and funded with the NOAA Climate Resilience Grant.

Extension’s purpose to which we commit is to teach, learn, lead and serve, connecting people with the University of Wisconsin, and engaging with them in transforming lives and communities. Furthermore, Extension is committed in helping to provide educational initiatives to indigenous people in Wisconsin.

Regards,

[Signature]

Karl J. Martin
Dean and Director
University of Wisconsin-Madison Division of Extension
TO: Mr. Michael Aprill and Professor Pramod Parajuli  
FROM: [REDACTED]  
DATE: April 27, 2019

Michael and Professor Pramod Parajuli, I am honored to serve your team as the project director for the 2019 Climate Strong! Professional Development Institute, co-project PI with the Fond du Lac Tribal and Community College on the Climate Strong! Initiative, and as a Professor of Community Resource Development with the University of Wisconsin-Extension. My position focus is environmental stewardship, climate change, and leadership that integrates indigenous knowledge and builds partnerships with tribal communities and tribal educators.

I support Michael Aprill conducting research on behalf of the research team as a participant observer in this institute. The institute will take place at the Northern Great Lakes Visitor Center in Ashland, Wisconsin, and neighboring tribal communities of Bad River and Red Cliff, on July 8th to July 12th, 2019.

I am very supportive of the team’s research and will facilitate opportunities Michael to meet elders from the Red Cliff and Bad River Bands of the Lake Superior Chippewa and learn more about integrating indigenous ecological knowledge into educational programs, like Climate Strong! I will help Michael learn more about working with tribal partners to bring indigenous voices into climate change education by integrating culture and science.

Michael participated in a climate change field course that I conducted for the University of Wisconsin-Stevens Point in 2018. He is familiar with several of the local specialists and locations that will be featured in the 2019 Climate Strong! Institute and has offered to assist me in addition to conducting his research.

Again, I am looking forward to working with both of you and assisting Michael with his doctoral research.

If you need any more information, please contact me.
9/1/20

Principal Investigator: Pranab Parajuli
Protocol Number: 2019-31-06-02
Protocol Title: Ojibwe Culture & Knowledge of Climate Change in Fourth-grade Curricula at Wisconsin Elementary Schools
Modification Approval Date: 9/1/2020
Protocol Expiration Date: 8/1/24
Review Category: Exempt 2
UWSP FWA: 00017591

Dear Dr. Parajuli:

Your request for changes to the above referenced human subjects research project has been approved by the University of Wisconsin Stevens Point Institutional Review Board (IRB) Committee. This approval is limited to the activities described in the approved protocol, and extends to the performance of these activities at each applicable site identified in the application for IRB review. In accordance with this approval, the specific conditions for the conduct of this research are listed below, and informed consent from subjects must be obtained as indicated. Additional conditions for the conduct of human subjects research may be detailed below.

Additional Conditions:

All individuals engaged in human-subjects research are responsible for compliance with all applicable UWSP Research Policies. The Principal Investigator is responsible for assuring all protocol personnel review and adherence to applicable policies for the conduct of human-subjects research.

The IRB maintains an official protocol file for each study to meet the University’s regulatory obligations for record keeping. Principal Investigators are responsible for maintaining all records related to the protocol, and are required to share with the IRB. The IRB is not responsible for maintaining study documents for researchers.

Your project approval expiration date is listed above. Exempt protocols have an automatic 5-year approval period. As a courtesy to you, and to reduce administrative burden, the IRB will require an annual update from the Principal Investigator on the status of this study. It is your responsibility to inform the IRB if the project is complete or still in operation. If the study needs to remain open after year 5, you must submit a new protocol. Lapses in approval should be avoided to protect the safety and welfare of enrolled subjects. When you plan to close your study, submit a Protocol Closure Form to irbchair@uwsp.edu.

No changes are to be made to the approved protocol or study documents (i.e., consent forms, surveys, etc...) without prior review and approval of the IRB. To modify an existing protocol, complete the Protocol Modification Form and submit to irbchair@uwsp.edu.

If there are any injuries, problems, or complaints from participants, you must notify the IRB at irbchair@uwsp.edu within 24 hours.

If you have any questions, please contact me. Good luck with your project.

Sincerely,

Anna Haines, Ph.D.
IRB Chair
ahaines@uwsp.edu
715-346-2383

cc: Michael Aprill
Kimberly Haas <khaas@judicare.org>
Wed 5/8/2019 12:06 PM
To: April, Michael L

Michael:

You have WJ’s permission to use the image. If we can help in any other way, please let us know.

Kimberly

**Attorney Kimberly Haas**
Executive Director
Wisconsin Judicare, Inc.
401 5th Street, Suite 200
PO Box 6100
Wausau WI 54402-6100
(715) 842-1681
(800) 472-1638
Fax: (715) 848-1885
khaas@judicare.org
www.judicare.org
## Appendix C. Timeline

### Table C1. Timeline

<table>
<thead>
<tr>
<th>Task</th>
<th>Completed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature Review, DP, IRB Protocol</td>
<td>Fall 2018 &amp; Spring 2019</td>
</tr>
<tr>
<td>IRB submission</td>
<td>May 3, 2019</td>
</tr>
<tr>
<td>Submit IRB Revisions</td>
<td>June 3, 2019</td>
</tr>
<tr>
<td>Dissertation Proposal Oral Defense</td>
<td>June 9, 2019</td>
</tr>
<tr>
<td>Applied Residency Project</td>
<td>July 8, 2019-July 12, 2019</td>
</tr>
<tr>
<td>Recruitment: Bad River &amp; Red Cliff Elders</td>
<td>July 8, 2019-July 26, 2019</td>
</tr>
<tr>
<td>Recruitment: UW-Extension Educators</td>
<td>June 17, 2019-July 12, 2019</td>
</tr>
<tr>
<td>IRB Modification #1 (Increase Elders, add interview question) &amp; approval</td>
<td>Oct. 4 – Oct. 10, 2019</td>
</tr>
<tr>
<td>Schedule Elder Interviews</td>
<td>Oct. 10 – Oct. 30</td>
</tr>
<tr>
<td>Recruitment: WES Educators</td>
<td>Oct. 25-March 15, 2020</td>
</tr>
<tr>
<td>Elders: informed consent &amp; interviews</td>
<td>Oct. 19-Nov. 16, 2019</td>
</tr>
<tr>
<td>UW-Extension educators: informed consent &amp; interviews</td>
<td>July 11, 2019-Oct. 25, 2019</td>
</tr>
<tr>
<td>WES educators: informed consent &amp; interviews</td>
<td>Feb. 25-March 21, 2020</td>
</tr>
<tr>
<td>Collect curriculum data for QCA &amp; CDA</td>
<td>June 11, 2019–Oct. 1, 2019</td>
</tr>
<tr>
<td>Pre-Data Analysis of Interviews &amp; WES curriculum</td>
<td>June 11–Nov. 15, 2019</td>
</tr>
<tr>
<td>Research data collection (Includes Interviews &amp; QCA)</td>
<td>Nov. 15, 2019</td>
</tr>
<tr>
<td>Interview transcriptions &amp; verification</td>
<td>Oct. 19, 2019-April 14, 2020</td>
</tr>
<tr>
<td>Coding, RTA, CDA, QCA</td>
<td>Jan. 1 – June 1, 2020</td>
</tr>
<tr>
<td>IRB Modification #2 (Increase WES) &amp; Approval</td>
<td>Feb. 26-March 3, 2020</td>
</tr>
<tr>
<td>Full dissertation draft to chairperson</td>
<td>Aug. 2, 2020</td>
</tr>
<tr>
<td>Dissertation Oral Defense</td>
<td>August 15, 2020</td>
</tr>
</tbody>
</table>
### Table C.2. Timeline of Phases

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploratory Experience: NR-605: Lake Superior Region: Natural Resources, Culture &amp; Climate</td>
<td>Recruitment</td>
<td>Coding Elder Interviews</td>
</tr>
<tr>
<td>Establish relationships: WES District, UW-Extension, &amp; Tribal Elder Offices</td>
<td>Participant-Observer: Climate Strong! &amp; Red Cliff / Bad River Elder Presentations</td>
<td>RTA</td>
</tr>
<tr>
<td>Fall 2018-Spring 2019</td>
<td>7/2019</td>
<td>1/2020-6/2020</td>
</tr>
<tr>
<td>Literature Review, establish theoretical framework, &amp; curriculum models</td>
<td>Interviews</td>
<td>QCA &amp; CDA: Science &amp; Social Studies Curricula</td>
</tr>
<tr>
<td>Obtain letters of support from school district, Tribal Offices, &amp; UW-Extension</td>
<td>Transcriptions</td>
<td>Member check / Revisions</td>
</tr>
<tr>
<td>Complete IRB process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring 2019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IRB Modifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/2019 &amp; 3/2020</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix D. Protocols

Outline for Interviews: Red Cliff and Bad River Elders

1. Do you have a word for climate change in your own language?
2. How would you like me to address you? How are you addressed within the community?
3. In what roles have you played in your community?
4. Would you like to share the origin base about your tribe?
5. Have you made any observations that you believe to be related to climate change or climate disruption? Have you noticed anything different today than in the past?
   a. If not mentioned, have you observed any changes in the water, of the lake or other bodies of water, medicines, forests, wind, weather, food, game (hunting), gathering.
6. Has any of this impacted your rituals or way of life?
7. Has any of this impacted your ability to share your stories to the younger generation?
8. How would you like the Wisconsin fourth-graders to learn about and know about what is happening? What is most important for them to know. How should that be put into the curriculum?
9. Do you have anything else you would like to add that we have not covered or do you have any questions?
Outline for Interviews: UW-Extension Educators

1. What is your diagnosis of what is happening in the tribal communities in terms of climate change and disruption?

2. What has the extension done to help the tribal people to adapt to climate change and disruption?

3. What has been your role in working with tribal communities to mitigate the impact of climate change and disruption?

4. What have the tribes done by themselves or in collaboration with UW Extension to adapt to climate change and disruption?

5. What have you learned by working with tribal communities?

6. What do you wish you would have done that you have not done?

7. Have you heard of the idea of drawdown of climate change and disruption? [long term reversing] Do you see any ways that UW Extension can contribute to drawdown of excess carbon?

8. How would you like the Wisconsin fourth-graders to learn about and know about what is happening around climate change and disruption? What is most important for them to know? How should that be integrated into the curriculum?

9. Do you have anything else you would like to add that we have not covered or do you have any questions?
Outline for Interviews: WES Educators AND Follow Up Clarification

1. What is your background in terms of training, education, and teaching experience related to Ojibwe ecology, culture, and knowledge? (If not brought up by teachers, ask about Act 31 training)

2. What is your background in terms of training, education, and teaching experience related to climate change and disruption?

3. What observations if any have you had or observed related to climate change / disruption?

4. What topics do you cover in your social science or science courses that are related to climate change and disruption?

5. What methods and pedagogical activities do you use to teach those topics (i.e. multimedia, video, fieldtrips, etc.)?

6. What content resources do you use to teach those topics?

7. What topics do you cover that are related to Ojibwe culture, ecology and knowledge?

8. What methods/activities do you use to teach those topics?

9. In addition to the textbook content, what other resources do you use to teach those topics?

10. Have you thought about crossing over the curriculum of climate change and disruption and Ojibwe or Indigenous culture? If so, how have you done so?

11. Do you have anything else you would like to add that we have not covered or do you have any questions?
Protocols for Reflective Thematic Analysis (RTA)

Protocols for RCA were used for developing themes for interviews. These steps were based off of those developed by Braun and Clark:

- becoming familiar with the data,
- generate initial codes,
- search for themes,
- review themes,
- defining themes, and
- write-up (Maguire & Delahunt, 2017, p. 3354).

Protocols for Qualitative Content Analysis (QCA)

Protocols for QCA were developed from curriculum models by Apple (1971) and Cajete (1994a). The protocols used included the following steps modified from Weber’s (1990) process for QCA:

- Choosing a body of text;
- Typing the text including image descriptions using Microsoft Word;
- Becoming familiar with the text by reading the text, reviewing images, and footnotes;
- Using the Microsoft Word comment feature, I then coded the text for the presence or absence of each commonality;
- Identifying themes and subthemes in the identified data; and
- Making inferences to answer the research question(s).
Protocols for Critical Discourse Analysis (CDA)

Protocols for CDA were used concurrently with QCA to analyze texts, specifically to look for hidden curriculum alongside Michael Apple (1971), and Gregory Cajete (1994a) curriculum models. The steps were modified using Van Dijk’s (1993) CDA methods:

- choosing the body of text,
- typing the text including image descriptions using Microsoft Word,
- becoming familiar with the text by reading the text, reviewing images, and footnotes,
- using the Microsoft Word comment feature, note any discourse in the text including:
  - use of modifiers,
  - level of completeness (missing details)
  - presence of irrelevant information described at higher levels
  - negative categorization of Native Americans that marginalize opinions or actions,
  - perspective or point of views not Native or lacks Native-voice,
  - Implicitness, implications, presuppositions, and vagueness.
- tabulate the data
- making inferences to answer the research question(s).
### Appendix E. Codebook

#### Table E1. Eighteen Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA</td>
<td>BALANCE. Living life with others. Balance of community &amp; family. Includes balance of emotional, mental, or physical health.</td>
</tr>
<tr>
<td>CS</td>
<td>CYCLICAL or SPIRALING. Cycles, spirals, or circles</td>
</tr>
<tr>
<td>F</td>
<td>FLUIDITY. changing, adaptation</td>
</tr>
<tr>
<td>G</td>
<td>GRATITUDE. appreciation for self or others. Includes appreciation of culture or heritage. Readiness to show appreciation. Thankful.</td>
</tr>
<tr>
<td>HC</td>
<td>HARMONIOUS COEXISTENCE. Harmony with creation. All nature for a purpose. All are relatives, web of interrelationships. Living peacefully together. A purpose of one being for another. Interconnects one being with another for living peacefully.</td>
</tr>
<tr>
<td>HO</td>
<td>HOLISTIC. Big picture, everything has a place, mind/body/spirit connected</td>
</tr>
<tr>
<td>HU</td>
<td>HUMILITY. Live life selflessly &amp; not selfishly, humble, responsibility. Calmness, meekness, gentleness, &amp; patience. Reflect on how to present ourselves. Awareness of balance &amp; equality for all including plants, animals, &amp; humans.</td>
</tr>
<tr>
<td>KC</td>
<td>KINCENTRISM. Surroundings viewed as kin. Plants, animals, geology or other objects as kin or living. Importance of Earth. Connecting to the Earth or part of the Earth.</td>
</tr>
<tr>
<td>KD</td>
<td>KINDNESS. caring, sharing, concern shown.</td>
</tr>
<tr>
<td>L</td>
<td>LIBERTY. Feeling or freedom from oppressive restrictions imposed by authority on way of life, behavior, or political views. Take action or stand up for liberty or freedoms.</td>
</tr>
<tr>
<td>O</td>
<td>ONENESS. Unified as a whole as Ojibwe people, tribe, Anishinaabe, community, or society. Coming together. Oneness as a culture.</td>
</tr>
<tr>
<td>RC</td>
<td>RECIPROCITY. Mutual benefit, giving back.</td>
</tr>
<tr>
<td>RL</td>
<td>RELATIONALITY. Connectedness. Connects cause &amp; effect. Connecting one object or being to another or action. Connection to place.</td>
</tr>
<tr>
<td>RS</td>
<td>RESPECT. Thinks of needs of others; mindful of all living things, treats self &amp; others well; includes respect for Earth or resources; respect Elders or Elder knowledge; respect traditions, culture or heritage; respect community; or respect orders (i.e. physical world, plant or animal beings)</td>
</tr>
<tr>
<td>RT</td>
<td>RESTORATIVE. Ability to bring back health, strength, or feelings of well-being. Revitalization of culture.</td>
</tr>
<tr>
<td>SH</td>
<td>SHARING. Can be physical or actions. Sharing of stories or ideas.</td>
</tr>
<tr>
<td>SU</td>
<td>SURVIVAL. Perseverance, determination to continue despite circumstances. May include physical, financial, or cultural survival or survival as a people.</td>
</tr>
</tbody>
</table>
Table E2. Additional Three Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BR</td>
<td>BRAVERY. Face problem with integrity, even if consequences may be unpleasant. Positive choices. Stand up. Courage in thinking &amp; speaking.</td>
<td></td>
</tr>
<tr>
<td>HN</td>
<td>HONESTY. Doing right thing &amp; saying it. Honest to self. Give value to efforts of our own &amp; others.</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>TRUTH. Having knowledge of cultural teachings. Ability to act without regret. Knowing who we are in our heart. Always seek truth. Do not deceive yourself or others.</td>
<td></td>
</tr>
</tbody>
</table>
# Appendix F. Sample Coding

**Table F1. Climate Disruption Example Codes; Theme 1, Loss of Reservations**

<table>
<thead>
<tr>
<th>Subtheme</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS</td>
<td>And so, the effects, when it comes to high water; then you have erosion around the banks, &amp; then you start losing landmass… We had beaches that went for a long way, &amp; some spots we seen a good mile. Other spots we might've seen beaches here &amp; there is smaller beaches. But we're losing the beaches now. There are no beaches by the Lake. (Gitchigaabo Bebezhigogonshi)</td>
</tr>
<tr>
<td>BS</td>
<td>Well, when climate change, the water level started increasing, then it started washing away the beach, but also parts of the shore line where, I think some parts like 29 feet are gone. (Niigaaniigaabowikwe)</td>
</tr>
<tr>
<td>BS, FRWL</td>
<td>Also, I’ve lost 10 feet of shoreline along lake shore in the past two years. (Moka Giggis)</td>
</tr>
<tr>
<td>FRWL</td>
<td>I think the other thing too is that when I noticed one thing was a while back, this was before climate change was really being looked at; was we noticed that a couple fasting sites where we used to go fasting; it was wet there marshy &amp; foggy. It never used to be that way. And that was before the flood of 2016 that I noticed that. (Esie)</td>
</tr>
<tr>
<td>FRWL</td>
<td>And so, the effects, when it comes to high water; then you have erosion around the banks, &amp; then you start losing landmass. And, we see that the rivers are getting bigger; we have a place that culturally that we go out in Raspberry &amp; there's a little Island we call that Monidoominis, the Spirit Island. And the erosion in the last 15 years; the island’s getting really small, it's almost marsh now. So we do see a lot of effects. (Gitchigaabo Bebezhigogonshi)</td>
</tr>
</tbody>
</table>
### Table F2. Climate Disruption Example Codes: Theme 2, Changing Climate

<table>
<thead>
<tr>
<th>Subtheme</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>WD</td>
<td>We got a lot more wind than we used to have. Where we live right here, we have a lot &amp; we don't live that close to the Lake[Superior], but it's a heck of a lot windier than it ever was for some reason. (Misajidamoo)</td>
</tr>
<tr>
<td>WD</td>
<td>Wow. When I fishing we never had wind like we had today. No. I mean we had 30-mile-an-hour wind when our fishing was big. It was a good size. You know, a good wind. Right now of course. I think there's a couple of weeks we had like 40, 45 mile-an-hour, which we never heard of before you know, 50 years ago. Never. Just like we get them freak winter storms. (Adikameg)</td>
</tr>
<tr>
<td>TM</td>
<td>In the last five years now, our winters have been milder. That's what made me change my mind. Like when you see on TV the climate change was El Niño &amp; all that, 10-years-back I had thought they were nuts. But, in my life now, I can see in my life now, when the hell did we ever get a thaw, snow melting in January, February which were the coolest months. But now, we get the Chinook winds. (Adikameg)</td>
</tr>
<tr>
<td>TM</td>
<td>And our seasons are fluctuating so much. It could be hot &amp; then cold. I've lived down here even now since 1975. And I've noticed the winters are getting colder, longer &amp; the summers are shorter. And you know, I've noticed that myself. (Morning Star)</td>
</tr>
<tr>
<td>PPT</td>
<td>It seems like there's more snow now than there ever. (Morning Star)</td>
</tr>
<tr>
<td>PPT</td>
<td>We didn't have a good year for our rice because it was too much water &amp; there was a lot of rain. And this year we had a lot of rain. (Esie)</td>
</tr>
<tr>
<td>Subtheme</td>
<td>Example</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
</tr>
<tr>
<td>AB</td>
<td>And so we lose more fish because they're not spawning. If the water changes during their spawning season; then we see the effects because they're either spawning too early or spawning way late. (Gitchigaabo Bebezhigogonshi)</td>
</tr>
<tr>
<td>AB</td>
<td>And, rabbits, you know that rabbit, when I was a kid here growing up here, I could go out &amp; pick a spot &amp; probably get 30 or 40 rabbits. A ton of rabbits. Today you don't see that. You don't, you might find a trail or two &amp; you know rabbits are, of course, fast producing animals. (Gitchigaabo Bebezhigogonshi)</td>
</tr>
<tr>
<td>PB; AB</td>
<td>I used to pick enough forests. They were prevalent, beautiful, wild flowers. I don't see them anymore. (Bee Pollen)</td>
</tr>
<tr>
<td>PB</td>
<td>We always gathered. We don't see the blackberries anymore like we used to. There'd be tons of it. Tons of berries. Raspberries, also hazelnuts. I hardly see them. Of course. I haven't been looking lately. (Bee Pollen)</td>
</tr>
<tr>
<td>PB</td>
<td>O yea, we used to have a lot of strawberries. I forgot to say that. Picking them along the roads &amp; stuff &amp; in the back &amp; now we don't hardly see them. (Bee Pollen)</td>
</tr>
<tr>
<td>PB *</td>
<td>I think it's really there to protect the other plants cause we can't get past it to get in there. But there's other medicines that we've been picking, not as much as we want to because it's too wet. But on the other hand, this year was a really good year for wild fruit. Wild grapes were very plentiful this year. (Esie)</td>
</tr>
<tr>
<td>PB</td>
<td>the one I'm thinking of specifically are the maple trees, the sugar Maples because climate change affects that big time. (Esie)</td>
</tr>
<tr>
<td>PB</td>
<td>But the strawberries, those I think are affected by climate change too. Because the strawberries, depending on when the snow melts, if there's enough snow, because the snow melts &amp; gives it those roots. The water, there's not enough snow in certain parts of the Rez. (Esie)</td>
</tr>
</tbody>
</table>

* = Mention of medicines by participant
Appendix G. Framework for including Ojibwe Knowledge & Climate Disruption

Unit 1. Engineering & Technology

Several activities have been suggested that meet the same goals of the HMH activities, while also addressing OC, CC, or KCC. Some also include ALT, ELA, or Math. Most of the suggested activities focus engineering and solving problems, specifically mitigation of climate disruption. (Table G1)

Unit 2. Energy & Waves

Several of the suggested activities are associated with water waves and beach erosion, as well as transfer of energy and disruption of energy cycles from climate change. (Table G2)

Unit 3. Waves

Suggested activities often focus on water waves, some including the use of multimedia such as pictures or video and in some cases video conferences with tribal Elders. As suggested by Elders, some include connection to place, specifically Wisconsin and may require a visit the Lake Michigan shoreline which is located in the WES school district. (Table G3)

Unit 4. Plant Structure & Function

Examples provide opportunities to participate in video conferences or presentations with a tribal Elder. The Elder will most likely be or have been a harvester (e.g. maple sugaring, or bark). It should be someone familiar with changes in plant structures and functions and how those changes have impacted their ability to harvest. Students will use the G-WOW curriculum to report findings. (Table G4)

Unit 5. Animal Structure & Function

Many of these activities include student writing and reflecting. They incorporate plant and animal beings. Some include the use of GLIFWC’s vulnerability assessment. (Table G5)
Unit 6. Changes to Earth’s Surface

Most of these activities revolve around water. They also include several suggestions provided by Ojibwe Elders such as the use of a water table. They incorporate the use of maps, images, and interviews. (Table G6)

Unit 7. Rocks & Fossils

Examples include activities related to changes in Earth surface. They may focus on online research and use of GLIFWC’s vulnerability assessment and the G-WOW model. Students explore adaptation of Ojibwe people and project how they may have to adapt in the future. (Table G7)

Unit 8. Natural Resources & Hazards

Activities focus on mining, oil pipelines, and other hazards to land or water. All have incorporated ELA. (Table G8)
## Table G1. HMH Unit 1, Engineering & Technology Alignment

<table>
<thead>
<tr>
<th>HMH Identified Topic</th>
<th>HMH Identified Activity</th>
<th>Suggested OC, CC, or KCC Activity</th>
<th>ELA, Math, or ALT*</th>
<th>Potential Goal</th>
<th>Power Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound/Culture</td>
<td>Tour cultural arts facility.</td>
<td>Watch a pow wow &amp; how sound is manipulated, can be done as an extension of the Historical Society trip.</td>
<td>ALT</td>
<td>OC</td>
<td>1 &amp; 4</td>
</tr>
<tr>
<td>Tools</td>
<td>Identify gadgets &amp; how they solve problems.</td>
<td>Identify Native tools &amp; how they solve problems.</td>
<td>OC</td>
<td>1 &amp; 4</td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>Identify design problem including constraints on materials, time, &amp; cost.</td>
<td>Research &amp; design a solution to erosion along beaches.</td>
<td>ELA, Math</td>
<td>CC, KCC</td>
<td>1, 2, 3, &amp; 4</td>
</tr>
<tr>
<td>Engineering, Technology, &amp; Natural World</td>
<td>Students identify mimicry of technology from animals.</td>
<td>Research biomimicry &amp; design technology using biomimicry to address climate change.</td>
<td>ELA</td>
<td>CC</td>
<td>1, 2, 3, &amp; 4</td>
</tr>
</tbody>
</table>

*Alternatives (ALT) = Art, PE, or Music
<table>
<thead>
<tr>
<th>HMH Identified Topic</th>
<th>HMH Identified Activity</th>
<th>Suggested OC, CC, or KCC Activity</th>
<th>ELA, Math, or ALT</th>
<th>Potential Goal Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy from Wood</td>
<td>Explore, research, &amp; report environmental consequences of burning biofuels in developing countries.</td>
<td>Explore, research, &amp; report environmental consequences of burning biofuels on Wisconsin’s indigenous people &amp; culture.</td>
<td>ELA</td>
<td>OC, CC, KCC</td>
</tr>
<tr>
<td>Where does energy come from? Cause &amp; Effect</td>
<td>Can you explain it? Students study an image &amp; explain where energy comes from [Image of train moving].</td>
<td>Students study images of floods &amp; beach erosion. Students explain where the energy comes from. Use water tables to demonstrate flooding.</td>
<td>ELA</td>
<td>CC</td>
</tr>
<tr>
<td>Cycles of Matter &amp; Energy Transfer in Ecosystems</td>
<td>Students develop, &amp; use models to explore how energy &amp; matter flow through natural cycles.</td>
<td>Students trace the flow of energy through an ecosystem &amp; identify how the flow of energy may be altered by climate change.</td>
<td>ELA</td>
<td>CC</td>
</tr>
<tr>
<td>Science is a Human Endeavor</td>
<td>Learn how most scientists &amp; engineers work in teams. Learn how science affects everyday life.</td>
<td>Learn how a tribe works as a team in cooperation with GLIFC to mitigate climate change.</td>
<td>ELA</td>
<td>OC, CC, KCC</td>
</tr>
<tr>
<td>Hot &amp; Cold</td>
<td>Students learn how heat transfers from hot to cold.</td>
<td>Students explore heat transfer, collecting data, &amp; link to climate disruption.</td>
<td>Math</td>
<td>CC</td>
</tr>
</tbody>
</table>

Table G2. HMH Unit 2, Energy & Waves
### Table G3. HMH Unit 3, Waves & Information Transfer

<table>
<thead>
<tr>
<th>HMH Identified Topic</th>
<th>HMH Identified Activity</th>
<th>Suggested OC, CC, or KCC Activity</th>
<th>ELA, Math, or ALT Potentia Goal</th>
<th>Power Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave Properties, Patterns</td>
<td>Explore characteristics &amp; patterns of waves using models</td>
<td>Build shoreline models. Measure &amp; compare the impacts waves. Design ways to reduce impacts on the shoreline.</td>
<td>Math ALT</td>
<td>CC 1, 2, 3, &amp; 4</td>
</tr>
<tr>
<td>Cultural Sounds</td>
<td>Research culture’s traditional instrument. Present to class.</td>
<td>Research a traditional instrument used by a Wisconsin tribe. Research climate impacts now or in the future on making that instrument. Present to class including sound clip.</td>
<td>ELA ALT</td>
<td>OC, 1</td>
</tr>
<tr>
<td>Wave Parts</td>
<td>Have students study the model diagram of a wave.</td>
<td>Visit Lake Michigan shoreline &amp; observe waves &amp; parts. Diagram a wave &amp; discuss factors influencing the patterns. Show video of Bad River or Red Cliff shorelines over time. Connect with climate disruption.</td>
<td>ELA ALT</td>
<td>OC, 1 &amp; 2</td>
</tr>
<tr>
<td>Patterns &amp; Technology</td>
<td>Study Doppler effect. Explore applications &amp; connection to wave properties.</td>
<td>Review weather maps of the 2016 &amp; 2018 storms resulting in mass flooding in the Bad River water basin. Review images &amp; data of the aftermath of the storms, Doppler &amp; weather maps. Watch online interviews with tribal members following the weather events &amp; reflect in a writing journal about those impacts.</td>
<td>ELA Math</td>
<td>OC, 1, 2, 3 &amp; 4</td>
</tr>
<tr>
<td>Constructing Explanations &amp; Designing Solutions</td>
<td>Generate &amp; compare solutions to a problem.</td>
<td>Video conference with tribal Elders about Climate Disruption &amp; impact on Ojibwe culture. Discuss with the Elders their observations &amp; suggestions for mitigating climate disruption &amp; impacts on their culture Generate &amp; compare solutions.</td>
<td>ELA</td>
<td>OC, 1 &amp; 3</td>
</tr>
</tbody>
</table>

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### Table G4. HMH Unit 4, Plant Structure & Function

<table>
<thead>
<tr>
<th>HMH Identified</th>
<th>HMH Identified Activity</th>
<th>Suggested OC, CC, or KCC Activity</th>
<th>ELA, Math, or ALT</th>
<th>Potential Goal</th>
<th>Power Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culture &amp; Plant Homes</td>
<td>Research Indigenous Australian shelters. Teachers diagram of one that used plant parts as main structure.</td>
<td>Research ways Indigenous people use plants. Diagram or build a model (e.g. Wigwam), cradleboard, or other culturally important item.</td>
<td>ELA, ALT</td>
<td>OC 1 &amp; 2</td>
<td></td>
</tr>
<tr>
<td>Culture &amp; Plant Homes</td>
<td>Research Indigenous Australian shelters. Students diagram of one that used plant parts as main structure.</td>
<td>Research ways Native Americans use plants within their culture. Research impacts climate disruption may have on the plant functions.</td>
<td>ELA</td>
<td>CC, CC 1</td>
<td></td>
</tr>
<tr>
<td>Tube structure in plants</td>
<td>Study how plants transport water.</td>
<td>Use a water table to create model of Bad River water basin. Use dyed water to generate a flood. Place celery in the floodplains. Measure &amp; observe results over 24 hours. How can plants mitigate climate change during floods?</td>
<td>ELA, Math</td>
<td>CC, KCC 1, 2, 3, &amp; 4</td>
<td></td>
</tr>
<tr>
<td>Influence of Engineering, Technology &amp; Science</td>
<td>Discuss photographs of rooftops with &amp; without green roofs.</td>
<td>Have students research the functions of plants &amp; how they can be used to improve our health &amp; mitigate climate change. Arrange a video conference with a tribal Elder to discuss the importance of plants.</td>
<td>ELA</td>
<td>OC, CC, KCC 1 &amp; 3</td>
<td></td>
</tr>
<tr>
<td>Plant parts</td>
<td>Study pictures of different plant parts &amp; discuss their functions.</td>
<td>Arrange a video interview with a tribal Elder familiar with harvesting. Discuss with them how plant parts are impacted by climate disruption.</td>
<td>OC, CC</td>
<td>CC, KCC 1</td>
<td></td>
</tr>
</tbody>
</table>
### OJIBWE CULTURE & CLIMATE CHANGE IN CURRICULA

**Table G5. HMH Unit 5, Animal Structure & Function**

<table>
<thead>
<tr>
<th>HMH Identified Topic</th>
<th>HMH Identified Activity</th>
<th>Suggested OC, CC, or KCC Activity</th>
<th>ELA, Math or ALT</th>
<th>Potential Goal</th>
<th>Power Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senses</td>
<td>Explore senses to see how animals see the world in different ways.</td>
<td>Blindfold students &amp; provide natural items of Native significance to explore sense (e.g. Balsam, rabbit fur. Research potential of climate changes. (ex. Fur color)</td>
<td>ELA</td>
<td>CC, OC, KCC</td>
<td>1</td>
</tr>
<tr>
<td>Cultural Menus</td>
<td>Students research a culture &amp; put together a sample menu.</td>
<td>Students research the food of Wisconsin Native Americans &amp; create a menu. Research the impact climate disruption has had on that menu.</td>
<td>ELA</td>
<td>CC, OC, KCC</td>
<td>1 &amp; 3</td>
</tr>
<tr>
<td>Local Wildlife</td>
<td>How does the environment &amp; living beings connect to structures of animals where you live?</td>
<td>Choose a plant or animal being &amp; study the structures &amp; how the being may be impacted by climate change. Refer to GLIFWC’s online vulnerability assessment.</td>
<td>ELA</td>
<td>CC, KCC</td>
<td>1, 3, &amp; 4</td>
</tr>
<tr>
<td>Animal Protection</td>
<td>Observe external structures of local animals. Classify the structures &amp; discuss how it helps survival.</td>
<td>Observe the structures of local animals. Discuss how they help them survive &amp; may need to adapt with climate disruption.</td>
<td>ELA</td>
<td>CC</td>
<td>1 &amp; 3</td>
</tr>
<tr>
<td>Human Impacts</td>
<td>Discuss how climate change is melting sea ice &amp; what that means to polar bears.</td>
<td>Review GLIFWC’s online vulnerability assessment. Choose a plant or animal being. Describe how it will be impacted by climate disruption &amp; the impact on Native culture.</td>
<td>ELA</td>
<td>OC, CC, KCC</td>
<td>1 &amp; 3</td>
</tr>
</tbody>
</table>
### Table G6. HMH Unit 6, Changes to Earth’s Surface

<table>
<thead>
<tr>
<th>HMH Identified Topic</th>
<th>HMH Identified Activity</th>
<th>Suggested OC, CC, or KCC Activity</th>
<th>ELA, Math or ALT</th>
<th>Potential Goal</th>
<th>Power Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Shapes Earth</td>
<td>Identify &amp; record evidence of how water shapes Earth (e.g. erosion).</td>
<td>View online videos of Native Americans discussing how water &amp; forces of nature have shaped their land. What impacts has this had on Ojibwe culture in Wisconsin?</td>
<td>ELA, OC, CC, KCC</td>
<td>1 &amp; 3</td>
<td></td>
</tr>
<tr>
<td>Studying Earth’s Surface with Maps</td>
<td>Make observations &amp; analyze data about maps.</td>
<td>Compare maps &amp; images of Northern Wisconsin over time. How has climate disruption &amp; severe weather events shaped the land &amp; maps. How do you think the Native people feel about losing this land? Have you noticed any changes here?</td>
<td>ELA, CC, KCC, OC</td>
<td>1, 3, &amp; 4</td>
<td></td>
</tr>
<tr>
<td>Draw a Map</td>
<td>Look at an online map of an area near your home to observe the shape of nearby rivers.</td>
<td>Look online to view &amp; print a map of an area near your school to observe the shape of nearby rivers. Compare your map to those of students from previous years. How do you think your observations are impacted by climate change?</td>
<td>ELA, ALT, CC, 1, 2, 3, &amp; 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cause &amp; Effect</td>
<td>Research how organisms are affected by changes in a river over time.</td>
<td>Research how changes in the Bad River &amp; Kakagon Sloughs impacts plant &amp; animal beings. Specifically research the impact on wild rice. How do changes in the water impact Ojibwe culture?</td>
<td>ELA, OC, KCC, 1 &amp; 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Effects</td>
<td>Research &amp; find images of ways floods have caused damages in Wisconsin.</td>
<td>Research &amp; find images of ways floods have caused damages in Wisconsin. Interview an adult about their observations of climate change &amp; report to your class.</td>
<td>ELA, CC, 1, 2, 3, &amp; 4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table G7. HMH Unit 7, Rocks & Fossils

<table>
<thead>
<tr>
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<th>ELA, Math or ALT</th>
<th>Potential Goal</th>
<th>Power Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patterns</td>
<td>Discuss how wind &amp; water change Earth’s surface.</td>
<td>Discuss how wind &amp; water change Earth’s surface. How has climate disruption altered the effects?</td>
<td>ELA</td>
<td>CC</td>
<td>1</td>
</tr>
<tr>
<td>How Did It Change?</td>
<td>Plan &amp; conduct online research on a modern animal. Working backwards, how did it change over time.</td>
<td>Plan &amp; conduct online research on a plant or animal being. Reference GLFWC’s vulnerability assessment &amp; G-WOW service learning curriculum. How do you think this being will be impacted by climate disruption? Draw a picture of how this being may have to change over time.</td>
<td>ELA, ALT</td>
<td>CC, ALT</td>
<td>1, 2, 3, &amp; 4</td>
</tr>
<tr>
<td>Weathering &amp; Erosion</td>
<td>How can weathering &amp; erosion affect rock layers?</td>
<td>Besides affecting rock layers, how can weathering &amp; erosion affect places of cultural or historical significance? What are some ways Ojibwe people have adapted to these impacts? How would you adapt if your home was affected?</td>
<td>ELA</td>
<td>CC, OC, ALT</td>
<td>KCC 1</td>
</tr>
</tbody>
</table>

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### Table G8: HMH Unit 8, Natural Resources & Hazards

<table>
<thead>
<tr>
<th>HMH Identified Topic</th>
<th>HMH Identified Activity</th>
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<th>ELA, Math or ALT</th>
<th>Potential Goal</th>
<th>Power Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reducing impact of hazards</td>
<td>Students research how to reduce the impact of water &amp; land-based hazards.</td>
<td>Research the impact of climate disruption hazards impacting people of Wisconsin. Identify several ways to mitigate or prepare for these hazards? Can we do anything to eliminate these hazards.</td>
<td>ELA</td>
<td>CC</td>
<td>1 &amp; 3</td>
</tr>
<tr>
<td>Mining Challenge</td>
<td>Set up a simulation for students to mine.</td>
<td>Research the impact of mining in Northern Wisconsin. What impact can mining have on the Bad River Watershed &amp; Ojibwe people?</td>
<td>ELA</td>
<td>OC</td>
<td>1 &amp; 3</td>
</tr>
<tr>
<td>Mining Challenge</td>
<td>Set up a simulation for students to mine.</td>
<td>Research the Enbridge Five Pipeline. Where does it originate. What does it carry &amp; where? What impact may this have on the Bad River Reservation?</td>
<td>ELA</td>
<td>OC, KCC</td>
<td>1</td>
</tr>
<tr>
<td>Water-based Hazards</td>
<td>Analyze a variety of water-based processes that can be hazardous. Design &amp; test solutions to lessen their impact.</td>
<td>Interview a Native person from GLIFWC about hazardous water-based processes they have experienced. If able, also interview a Native Elder. Compare the hazards that have been presented &amp; how we can come together to find solutions.</td>
<td>ELA</td>
<td>OC, CC, KCC</td>
<td>1 &amp; 3</td>
</tr>
</tbody>
</table>